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REPORT OF RURAL DEVELOPMENT TEAM
ON
AGRICULTURE AND RURAL DEVELOPMENT
IN
NICARAGUA
March - April 1964

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INTRODUCTION

On September 30, 1963, Nicaragua's Minister of Agriculture, Tomas Lacayo M., submitted a formal request to AID/Nicaragua for a team of experts who could evaluate Nicaragua's current agricultural program and advise the Government of Nicaragua and the technical assistance agencies on the most effective plan for agricultural development. The Minister indicated a need for a frank and objective appraisal and a set of recommendations in considerable detail. This request resulted in the appointment of a 5-man team referred to in a letter dated March 12, 1964 from Lyall E. Peterson, Chief Rural Development Division, OIA/IA/AID to J. R. Solana, Acting Director USAID/Nicaragua. The team studied the situation in Nicaragua for a period of six weeks beginning in mid-March 1964 and this is a report of its findings and recommendations.

Since the G. O. N. has asked for a frank and direct presentation of our findings, we hope that this report will be accepted and considered in the same spirit of objective and sympathetic frankness in which it is presented.

The team was composed of Dr. Brooks James, Dean of the College of Agriculture and Mr. Jackson Rigney, Coordinator of Programs of Foreign Aid, both of the University of North Carolina, representing the Land Grant College Association; Mr. Louis Heaton of the American International Association, a representative of private foundations in international development, Mr. Thomas E. Fatherree, State Director of the Farmers Home Administration in Mississippi, a specialist in agricultural credit, and Mr. George H. Day, Agricultural Economist and former Agricultural Attache, U. S. Department of Agriculture.

1. SYNOPSIS AND GENERAL RECOMMENDATIONS

Agriculture holds a dominant position in Nicaragua's economy and will be the major factor in this country's development in the near future. The 1963 census shows that nearly 60% of the people are rural and dependent on agriculture, and many more in the urban areas are concerned with processing and marketing of agricultural products. This means that not only the productive capacity of the nation but also the internal consumption potential is determined largely by the well being of the agricultural sector.

The fact that agriculture, including fish and forest products, accounted for 38% of GNP and for 85% of all exports in 1962 suggests that the national economy and the development process requires stronger support to agriculture. The appropriations for agricultural services and development in 1963 represented only 3 $\frac{1}{2}$ % of the total National Budget.

The commercial agriculture of Nicaragua is primarily in the hands of a relatively small number of farmers, and those who contribute most of the output is an even smaller number. This group appears to be operating at a reasonably high level of efficiency and economic returns. They are relatively up to date in the advantageous employment of modern technology. They are being fairly well served by credit agencies or the national banks, and new development activities for this group are being explored with admirable efficiency by the Development Institute (INFONAC). The greatest need of this group is to have a vigorous research program oriented toward greater efficiency through new technology, and an enormously expanded supply of technically trained personnel.

The remainder of the farm population contributes little to commercial agriculture, but it represents for Nicaragua a large reservoir of potential development and contribution to the national economy. This reservoir can only be tapped by an initial investment of government in technical services, provision of credit and the associated agrarian reform activities in the broad sense. In Nicaragua this group of rural people are largely untrained and devoid of production resources, but they exhibit an unusual attitude of willingness to work long and hard to fulfill their aspirations.

In view of the above circumstances, the team has concentrated its attention on those functions and services which would achieve the following:

- a) Provide for national self-sufficiency in training agricultural technicians through the University level.
- b) Organize the educational and research activities into a coordinated and effective program.
- c) Provide for sound national planning in agricultural production, marketing and development.
- d) Organize the supply of production credit into agencies best suited to the different needs.
- e) Give appropriate organizational support to agrarian reform in the broad sense.

The recommendations which came out of the team's study and deliberations are broadly categorized as follows and the details are given in the appropriate sections.

A. Recommendations in Education, Research and Extension

1. Highest priority should be given to reconstituting the research and educational services in agriculture.
2. An immediate, strong training program should be initiated before undertaking reorganization activities or financing improvements.
3. The formation of the proposed semi-autonomous Agricultural Institute of Technology (ITAN) which includes the Agricultural School, the Experiment Stations and the Extension Service in a Land-Grant University type of agency is strongly recommended.
4. The U.N. Special Fund or a Land-Grant College contract should be obtained to support the above Institute. However, since the National Economic Council already has approved a formal proposal along this line to the UNSF, and since we recommend that only one agency be responsible for providing the appropriate personnel, we would strongly endorse that proposal if accepted by UNSF.
5. Curriculum revision at the School of Agriculture should provide for specialization in plant or animal husbandry, and a serious revision of pedagogy is recommended.
6. The research program should be organized by commodities to ensure focus on major practical problems confronting Nicaraguan agriculture.
7. Extension should be reinforced, its objectives clarified and its field of action delimited; but its approach and philosophy need not be changed.
8. Vocational Agriculture training should be introduced into a number of secondary schools and should be a joint function of the public school system and the Agricultural Extension Service.

In backstopping the various activities listed above as well as in guiding most of those discussed in other sections of this report, it is self-evident that there must be recommended a competent top-flight overall leading economist in agricultural production and marketing, to serve as team leader, who can be made available to the Nicaraguan Government as soon as possible. This could be done under a PASA agreement with IADS.

With respect to any activity which requires manpower or materials, in addition to those needed by this economist, it is recommended that an understanding be established between the U. S. Government and that of Nicaragua that there must be:

1. A spontaneous and clearly expressed desire by the G.O.N. for such assistance.

2. Reasonably competent technical counterpart personnel continuously assigned to the activity.
3. The complete understanding on the part of the G.O.N. that these are its programs and that outside aid must be little more than a catalyst device to help establish these activities on a sound basis. It appears to the team to be essential that appropriate G.O.N. participation in personnel, buildings, maintenance, supplies and financing be started with the initiation of the specified activity and be continued to increase until the entire burden is borne by the Nicaraguan Government.

B. Recommendations in Agricultural Goals

Specific recommendations regarding Agricultural Goals and Economic Development are as follows:

1. That the Nicaraguan Government be commended for the efforts being made to organize for sound economic planning in its attempts to develop a 5-year investment program. Recognizing that this requires outside technical assistance, AID, together with JOPLAN, is providing substantial grant assistance in support of this development.
2. That the Team Leader referred to in the unnumbered paragraph above, be well versed in the latest techniques for promoting agricultural growth and development, including the assembly, evaluation and use of soils and other information on natural and human resources (see Appendix V).
3. That provision be made for supplying the Nicaraguan Government with consultants in highly specialized areas to take care of special needs as they arise in the agricultural and rural development process.
4. That provisions be made to assist in the training of Nicaraguans so that the Government of Nicaragua will be able to staff its agricultural planning programs with capable and well trained people.
5. That provisions be made to improve the agricultural data gathering processes of the Nicaraguan Government by supplying short time consultants where needed, and by providing equipment critical to the data gathering and analysis process.

C. In Marketing

1. That the marketing advisory activities be the responsibility of the Team Leader referred to above.
2. That he continuously discuss, with appropriate high-level G.O.N. officials and AID representatives, any problems as they arise in marketing and marketing policy, entertain specific requests for short- or long-term consultants or assistants in line with the three conditions specified above, and recommend appropriate action to Washington.

3. That he work closely with the AID specialists in Rural Development and in Cooperatives and other fields, as appropriate.

D. In Credit

The development of a supervised farm credit program to meet the needs of the Agrarian Reform Program for low income farmers, could be of tremendous importance to the well-being of more than half of the farm people in Nicaragua. Specific recommendations are:

1. That Nicaragua create in one of its autonomous agencies a program to serve the credit needs of low income farmers. Trainees for this program would be provided for under the section on education, research and extension.
2. That a credit representative be made available to serve as an advisor to the Nicaraguan Government.

E. In Agrarian Reform

1. The team recommends that all rural development activities for medium, small and subsistence farmers be made a part of the Agrarian Reform program and that the services of all appropriate technicians discussed above be made available to this area of activities.
2. That specialists in other problems relating to that program be provided, consistent with the three conditions specified above.

F. In Miscellaneous Rural Development Activities

1. That the trainees in home economics proposed in Section 2 support activities in Community Development, by backstopping present AID technicians and any others.
2. That the trainees in Extension proposed in Section 2 support activities in Cooperative Development as part of the Agrarian Reform program in the same manner.
3. That credit and educational assistance accompany the spread of Penetration Roads.
4. That the Food for Peace Program be oriented to include increasing support for community public works such as sanitary works, schools and other community buildings, streets, and penetration roads.

2. EDUCATION AND RESEARCH IN AGRICULTURAL DEVELOPMENT

A RESUME*

From 1950 to 1958 the Research and Extension and Agricultural Education Services associated with the Ministry of Agriculture (MAG) were strengthened under a joint Nicaragua-U.S. Servicio (STAN). With added support of STAN

*See Appendix III for full discussion.

by the National Congress, the MAG's National School of Agriculture increased its faculty and physical facilities to provide for a $4\frac{1}{2}$ -year degree in Agricultural Engineering instead of the former 3-year "Farm Specialist" (Perito) degree. In 1958, however, U. S. participation in STAN was essentially withdrawn (See Appendix III, p 32).

This move marked the beginning of a serious 6-year decline in the quality of these Services. Political interference in the appointment of personnel and in budget management caused a loss of public confidence in the MAG and other Ministries and has resulted in some Congressional reluctance to appropriate any increase in support of these and other major functions. The result has been a serious decline in morale and a desertion, from these and other sections of MAG, by most of the competent technicians to other public and private agencies. Research of the two MAG experimental stations has become ineffective. There has been a heavy student drop-out at the School of Agriculture, a serious weakening in the Extension Service staff and a general decline in MAG's efficiency.

On the other hand, there has been a remarkable development of confidence in autonomous (GON) and private agencies where most of the outstanding leadership in the country is found. Not only are the services of INFONAC, Banco Nacional, INCEI and other similar agencies highly effective, but their program is oriented toward stimulating private enterprise. This group appears to be reasonably efficient and profitable and is reasonably well served by credit agencies and private technicians. While certain of these recommendations may prove useful to this group, its greatest need appears to be a sharply expanded supply of technically trained personnel for its own vigorous research programs.

Of greater immediate concern is the situation with respect to the bulk of the agricultural sector comprised of middle and low-income farmers who are dependent upon GON agencies other than the INFONAC -- commercial group. Three conditions seem to call for special treatment in this area (Appendix III pp 33-34):

1. Shortage of qualified personnel. The extreme shortage of trained personnel at all levels is the greatest single deterrent to modern agricultural development. Although the Research, Extension and Agricultural School services probably hold the solution to this problem, a substantial corps of trained personnel appears to be a prerequisite.
2. Insulation from political patronage. With all phases of economic development heavily dependent on an efficient and competitive agricultural system, it is essential that job tenure be based on proven merit.
3. Greater budget support to agriculture. With agriculture supplying the working capital basic to economic development, the need for a budget which is sufficient to maintain agricultural programs at a level commensurate with their competitive importance, seem obvious.

AGRICULTURAL SERVICES

The nature of the current operations of each of the services, Research, Extension and University level education, together with their future functional potential may be summarized about as follows:

1. The Agricultural Research Program (EEA) should be staffed with the best possible corps of research scientists. At present, too much time appears to be spent on peripheral and theoretical subjects rather than on solving the country's major problems in production and marketing.

The EEA has been so over-organized into divisions, departments and sections as to make for excessive administration and for difficulty in fixing responsibility for attacking a problem in its entirety (Ibid. p. 43). Research efforts have tended to be scattered so thinly among a myriad of projects that no single result with significant impact on the economy is apparent. Inconclusive results bring a lack of confidence and support to the agency. The main causes of these deficiencies seem to be related to (Ibid. pp. 36-37).

- a. The Shortage of Trained Personnel: There is little mental preparation for examining the problems, to thinking of appropriate solutions and evaluating results. The responsibilities to be borne in research suggest that the head of each division and department should have a M.S. degree. Salaries should be commensurate with these responsibilities.
- b. Budget: The Congressional budget appears not only to be too small for current operations but is so fixed in detail and timing as to result in frequent waste (ibid. p.36).
- c. The lack of autonomy in action: Mainly the result of a shortage in qualified personnel, centralized control erodes scientific curiosity, personal initiative and general morale.

The one notable exception to these comments is the Division of Agricultural Economic Studies which has been doing some excellent analyses. Properly staffed and administered, the EEA could provide leadership in stimulating the adoption of the most effective modern techniques for solving the problems which limit the production and marketing of the major food and commercial crops of the country.

2. The Agricultural Extension Service (SEA), which started operations in 1951 and now has 15 agencies, is similar in organization and operation to that in the United States, with an extension agent, an assistant agent, and home demonstration assistant in each office. A true extension philosophy abounds from office boy to Director. The latter has clung desperately to the procedures and standards established by STAN. SEA has much the same problems as the other agencies of MAG, plus an important shortage in extension material and in transportation (ibid p.37). The budget has not been increased since STAN and few of the highly trained and motivated members of the old staff remain.

A US/GON Agricultural Station was established in the tropical eastern rain-forest area of Nicaragua at El Recreo in 1942, to serve as a source of rubber, quinine, and other products needed during the war. It is administered by the SEA, but no project activity is now in progress. With a new all-weather Rama Road nearing completion, the Station could serve an important function in agricultural development.

The work of the Extension Service is primarily oriented toward youth and adult clubs, cooperatives and general information programs through radio and press. It appears that fairly effective work is being done among a small fraction of the campesinos and some medium-sized coffee and fruit farmers.

If SEA is ever again to become a significant force in Nicaraguan agriculture, it must clearly define its goals and concentrate its efforts in certain areas. The most important and sharply defined responsibility of SEA would seem to be the very large group of small and medium-sized farmers. This group is extremely important to the developing economy of the nation, however, because it is here that the greatest potential exists for increasing the base of commercial agriculture (ibid pp. 45-46).

By working with this group through soundly planned programs of the Agrarian Institute, the National Bank and other agencies interested in the development of the small farmer, as well as through its own expanded programs, the Extension Service can go far in helping develop this potential.

Vocational Agriculture (ibid p. 38). With the discontinuance of vocational agriculture training at the School of Agriculture, the present facilities for training at the "farm specialist" level are limited to the 40 annual graduates of a deficiently staffed and poorly supported International Agriculture School (Catholic) at Rivas. Thus there is a serious deficiency in the members of sub-professional assistants needed by the institutional and private sectors of agriculture. This deficiency is being filled in part, either by unskilled labor or by the costly use of University graduates, neither of which is able to satisfy the country's needs.

3. The National School of Agriculture (ENAG) has 15 professors only four of which are on full time and, because of the serious student drop-out, graduates only about 10-13 University level students a year. The most urgent need of the college is a well trained and dedicated staff which immediate participation in an overseas training through the M. S. degree, should provide. With this as a basis and with basic changes in the curricular carried out such as recommended later, the college should be able to place all training and services at a full university level in fact as well as name.

INSTITUTO DE TECNOLOGIA AGROPECUARIA DE NICARAGUA (ITAN)

The apparent success of the former Servicio (STAN) suggests that an appropriate path to recovery should include many of the features of that agency, but with some reorganization concomitant with other steps.

Among the services of MAG^{1/}, special attention is being given to a recent proposal, approved by the National Economic Council (N.E.C.), to reestablish the research, extension and agricultural education services under an autonomous agency, the Technological Institute of Livestock and Agriculture (ITAN). Like the former Servicio (STAN), it would be patterned after the U.S. Land-Grant University system.

The MAG proposes to establish an administrative commission with the Minister of Agriculture as president, the other members being the directors of the Research, Extension and the School of Agriculture, and a representative each of the UNSF and FAO. The director of ITAN would be the principal advisor.

Assuming that ITAN would have considerable flexibility of operation within its overall budget, this proposal is strongly endorsed and the following comments suggested (ibid p. 40):

The Director of ITAN should have responsibility for welding the three services into a coordinated program: with personnel all on full time and cognizant of all pertinent ITAN activities; with each division or department closely integrated with others; with ITAN undertaking only those programs for which resources would permit completion; giving priority to problems of major national importance; with appointments, promotions and salaries based solely on merit; and with strict discipline maintained in all administrative and management functions.

Financing of ITAN would be directly from the General Budget at a minimum of about \$2,880,000 for the first four years (1964-67) and from a proposal approved by the N.E.C. for a UNSF grant of \$856,500 for technicians, scholarships and equipment. Assuming a modest increase in the GON budget, as implied, and a scale of gradually increasing take-over, this support seems to be substantially within reach of the present recommendations (ibid. pp. 54-60). Requests for additional support include (1) one for a loan of about \$383,000 from AID to acquire laboratory and dormitory space, additional equipment and livestock, for the agricultural college and (2) a proposal to have a Land-Grant University contract to backstop research. Although not part of the ITAN program, there has been a proposal by the University of Pennsylvania to establish a veterinary center to be staffed for a ten-year period under an AID grant totaling about \$1.3 million (ibid. pp 49 and following).

Each of these proposals has merit, but together they would not form well balanced coverage in terms of timing and compatibility. It is unlikely that F.A.O., the unnamed Land-Grant University and the University of Pennsylvania could service the new ITAN harmoniously and effectively at the same time (ibid. p. 49).

^{1/} Other services are basic studies to improve crops and livestock; plant and animal quarantine; meat inspection, pest control programs; veterinary and AI services; livestock registration; technical assistance to small farmers, chemical and drug control; forestry; and fish and wildlife.

Each of the proposals may be appraised about as follows:

1. The UNSF proposal is well conceived and should serve the needs of ITAN very well. Since it is patterned after the Land Grant University system, special efforts should be made to recruit U. S. personnel with corresponding experience to fill the positions proposed in the request. However, it is suggested, with respect to the agricultural college (ENAG), that relatively greater emphasis be placed on specialists in the basic sciences such as mathematics, physics, chemistry, biology and economics, than as proposed.

While the request for a U. S. Land Grant University contract would duplicate the UNSF proposal in important respects, a contract with a major U.S. University might prove to be a preferable alternative (ibid. p. 50).

Apparently in anticipation of the proposed \$383,000 loan from U. S. AID, only \$4,000 has been included in the UNSF project for equipment for ENAG. The AID loan should be activated as soon as adequate personnel and space is provided. The only other question that arises is with respect to the proposal to purchase animals and field equipment for ENAG instead of making these the resources accessible to both the school and the research service.

The University of Pennsylvania proposal recognizes a severe and possibly dangerous shortage of veterinary services in the country, but may not be well integrated with the ITAN program (ibid. p. 50).

ORGANIZING THE SERVICES

There remains the problem of the steps to be taken to achieve the potential capacity of each of the three services.

1. The Agricultural Research Program (EEA). Once the EEA has been rebuilt with an adequate technical staff, it should be completely reorganized so that each of the major production problems can be completely and exhaustively investigated by a single project group. Assuming close coordination between EEA and the college (ENAG), the EEA might be organized along major commodity lines.

There should be a complete review and reorientation of existing and proposed research projects. This would restrict research efforts to those projects which manpower and resources can adequately carry to completion. Some examples of projects of possible high priority are: total management and feeding of cattle combined with breeding and marketing, technical information to guide the use of fertilizers, and the possibilities of using stock ponds and other water sources for supplying the needs of the Central and Western ranges.

2. The Agricultural Extension Service (SEA). In defining its goals the SEA must take into account certain developments which cannot or should not be reversed (ibid. pp. 44-45). These include: (1) The growth of private farm advisory agencies which serve the large commercial farmers. This could be encouraged through such means as access to overseas training programs. SEA should not give high priority to this area even though it may have strong appeal. (2) The activities being initiated by INFONAC include

important irrigation projects which will have a high overhead development cost for which the affected farmers will need excellent technical support to be able to pay out. While all outside technical assistance agencies should be responsive to any requests coming from INFONAC, SEA should not divert its energies to specialized areas at the expense of the low-income farmer program discussed earlier. (3) The Agrarian Institute is inheriting several colonies representing socio-political commitments aimed at giving quick action to establishing colonies for the campesinos. Since these sensitive projects are being serviced by the Agrarian Institute and SEA will be unable to meet all of its major demands, it may seem advisable not to become presently involved in these projects.

Since the present procedures and methodology of SEA are essentially sound, only a few changes are recommended (ibid. pp. 46 and 47). There should be a substantial increase in the number of "farm experts" (Peritos Agronomos) at the vocational agricultural level to work with the large numbers of untrained small farmers. They may be very effective in multiplying the extension program under good supervision and technical backstopping. Many small farmers lack the resources to carry out SEA's recommendations. The formation of clubs and cooperatives and close coordination with other agencies making credit funds available would help orient SEA toward broad programs of farm planning and operation.

The Vocational Agricultural Schools should be developed at the secondary school level in a joint program of the SEA and the Ministry of Education. They would be established by adding vocational agriculture to one school in each Department of the country. The curriculum of these schools would be altered in the 4th and 5th years to include 8 courses in agriculture (ibid. pp. 47 and 48).

The private International School of Agriculture at Rivas should receive further assistance in a revision of the curriculum and in developing the staff.

3. The National School of Agriculture (ENAG). Once the ENAG is adequately staffed, two options in the curriculum should be offered. One of these would be in agriculture and one in animal husbandry, with the first three years of training the same for both (ibid. pp 40-43). The number of courses should be reduced and additional reading should be required. The facilities of the experiment station should be used for laboratory as well as thesis work and students should be used for most of the manual labor. More courses in agricultural economics should be introduced. An illustrative curriculum is shown on page 42 of Appendix III. Adult and farmer education should be offered through night courses, summer school and radio courses. A pre-University year should be initiated as a selective device and a means of reducing drop-out. The University should then be able to graduate 35 to 40 students a year instead of the present 10 to 13.

SUMMARY OF TRAINING, TECHNICIAN, FACILITY AND EQUIPMENT NEEDS

The problem now common to these services, the shortage of trained personnel, can be solved by:

- (1) an intensive selection and overseas training program,

- (2) an increase in salaries commensurate with responsibilities,
- (3) increasing the operating budget to a level justified by the caliber of the personnel, and
- (4) the encouragement of greater initiative and imagination by stimulating the competitive spirit through such incentives as greater autonomy.

Overseas Training - AID can help establish the strong training program to the B.S. and M.S. degrees to effect a basis for a major reorganization, and reorientation of the services. The training plan should provide all appropriate agencies with long-term ceilings. Unused scholarships in any given year should be available to other agencies or to other selected personnel. To remove the shortage of technicians, a major bottleneck in national development, the team recommends that several of the usual limitations be removed (ibid. p. 52).

(1) The Research Service (EEA) should be amply supplied with technicians before serious reorganization is undertaken. Ten to 15 present or potential staff members should be selected each year for a period of at least 5 years, for training in the United States through the Master's degree.

(2) The Extension Service (SEA) should be provided with 6 to 8 specialists with a Master's degree, each sufficiently trained in his specialty to keep completely abreast of his work. Eight to 10 participants should be selected annually for training to the Agricultural Engineer level to operate each of the proposed 15 principal and 15 sub-agencies of the Service.

In addition, shorter term training should be provided for:

- (a) Six to 8 participants in Vocational Agriculture to be selected annually for training in the U.S. or Puerto Rico for 1 to 2 years each under a three-year program. While there, they could develop curriculum materials for teaching in the Secondary schools.
- (b) Autonomous agencies such as INFONAC, Banco Nacional and INCEI should have complete access for training up to the B.S. level or higher. Those agencies with small-farm credit responsibilities should be provided with a program of 4-6 month on-the-job training in FHA, in addition to course work at the undergraduate (college) level in agricultural credit and related subjects.
- (c) In the case of a few areas, such as community development, about 5 to 8 Home Economists should be trained in AID-sponsored short courses in Puerto Rico or other Spanish-speaking countries.

(3) The National School of Agriculture (ENAG), under a similar 5-year schedule, should be staffed with qualified trainees dedicated to education. Prior to the time adequate instruction can be obtained locally, consideration might be given to choosing up to 5 bright students, at the end of their third year, to be sent to the U.S. to complete a B.S. in Agricultural Economics.

Technical Advisers. Depending on the timing of GON increases in effective support and the availability of trained full-time counterpart personnel, the following program of international technical advisers is recommended:

- (1) Research (EEA). In view of present conditions, and the likelihood that adequate counterpart personnel would not be on board, it is doubtful whether this agency would be ready to use more than 1 adviser before 1966. This could be modified by the recommendations of technicians brought in to work under the proposed Property Tax System (CABEI) loan, under the UNSF proposal or, by AID under a PASA agreement.
- (2) Extension (SEA). The proposed specialists in Agricultural Extension could be effectively used as soon as:
 - (a) the recommended changes in the administration of personnel and support funds are made,
 - (b) there is an increase in salaries to facilitate recruiting, and
 - (c) adequate vehicles are available (ibid. p. 53).

The specialists in rural youth work should have experience in vocational agriculture teaching and the ability to start the program of vocational agriculture in secondary schools. The Home Economists as well as the Vocational Agriculture Specialists would be useful at an early date.

Facilities - The constructions of new facilities, such as those included in the AID loan proposal, should not be done until the UNSF or the Land-Grant University team has had a chance to appraise the real needs and the rate at which they should be built. This may be further complicated by a proposal to move the EEA and/or the ENAG to a new location to make room for expanding the main airport. Extra care is recommended in selecting any new site (ibid. p. 53).

Equipment should be purchased only as trained technicians demonstrate the need and as operating and maintenance funds and trained personnel become available. Operating supplies such as glassware, reagents, etc. should be acquired when the GON provides for funds for maintaining or replenishing such supplies.

Implementation of the ITAN should involve the following levels of commitment by the GON, assuming the anticipated availability of trained technicians (ibid. pp. 54-60):

- (1) The ITAN Director's Office should be established by early 1965 with a Director, Assistant Director, and three employees supported by equipment, materials, and operation costs totaling about \$28,800 annually.

- (2) The Experiment Station (EEA) should anticipate half of its full complement of professional staff by the end of 1966 and the remainder by the end of 1967. A minimum professional staff should include about 27 specialists in the leading subjects. The combined cost of these professionals and 27 non-professional assistants together with other expenses would total about \$396,800 annually.
 - (3) The Extension Service (SEA) could begin rehabilitation earlier than the other Services but would be slower in reaching full staffing patterns which, by 1968, would be about 4 Administrative staff, 8 Extension Specialists, agents for the 30 agencies and sub-agencies, and other specialists and non-professional employees. The total cost of salaries would be about \$474,000 which, combined with equipment, material and operating costs is estimated at about \$688,000 annually.
- Vocational Agriculture in 6 of the major secondary schools could be staffed by 1966 with at least one outstanding teacher. The salaries already are included under SEA, since they would be SEA employees. In addition, there would be about \$24,000 in supplies and equipment.
- (4) The Agricultural School should be fully staffed and operating by the beginning of the school year in 1966 at an annual cost of about \$158,000.

A summary of the costs of foreign assistance, and to the Government of Nicaragua, by years, 1965-1969 is shown on the final page of Appendix III.

3. AGRICULTURAL GOALS AND ECONOMIC DEVELOPMENT^{1/}

Wherever people and resources are found there exists the challenge to bring together the resources and the people in such a way and in such combinations as to produce the goods and services needed by the people. Economic development is the process by which the people in an area organize and utilize their resources, including labor and management, to bring forth increased production. In a pragmatic sense this means the application of technology and management to given production situations to increase output and efficiency of production. As efficiency of production increases in one sector of the economy it may be necessary to transfer resources from the particular sector to another to avoid a surplus of one commodity or service and to meet the need for a deficit in another sector. This means that ways must be found to help bring about shifts in production and to increase the production of the most needed goods and services. Likewise, the owners of resources must find ways to shift resources from one use to another to meet the needs of the nation for future development (capital goods) and the needs of the people. For example, if one can adopt better management and output, increasing technology in agricultural production, so that less labor is required to produce the food and fiber needed for consumption, one can release from agriculture labor, management, and

^{1/} See also Appendix IV, Agricultural Commodity Production Picture.

other resources which can be used to produce other things needed by society. However, the economic and social system must be structured and operated so that there will be an incentive for workers to move, to change jobs, consumption habits, and living conditions and for the owners of capital to put their resources to new and more productive uses.

Increased efficiency and a greater output of goods and services accompanied by a transfer of resources from the production of one item to another enables a nation to continue its growth and development provided its system for dividing the fruits of production among its population is satisfactory or is working reasonably well. If a nation finds that it has a surplus of goods and services while its population goes hungry and naked, it is obvious that something is wrong with its system of distributing among its population the returns from increased efficiency and greater output. In a relatively free society one must always be concerned with effective demand for goods and services. Unless the masses of the people can be employed productively and compensated for their productivity they will not have purchasing power with which to buy goods and services. The result will be surpluses, eventually idle plants and farms, idle labor, depression and stagnation instead of economic development, prosperity and progress.

People are made more productive and more mobile by education and training. Increased productivity of the masses should result in more purchasing power in the hands of the masses. Increased mobility of the masses should result in more rapid adjustment of the labor force to new and developing opportunities for the production of goods and services. These adjustments should mean more purchasing power in the hands of all the people. However, if the total effective demand for goods and services lags behind production, and if surpluses begin to appear, it may be necessary for the Government to employ labor on public projects, often badly needed and worthwhile, to put purchasing power in the hands of those employed. If it is necessary to resort to this technique it should be carefully planned and administered so as to accomplish two objectives: namely, a) provide the employed with badly needed purchasing power, and b) produce something worthwhile for the benefit of the public. Examples would be the construction of roads, schools and other public service facilities.

THE ROLE OF AGRICULTURE IN ECONOMIC DEVELOPMENT

An economic system whether simple or complex, infantile or mature, is an interdependent system in which each part functions as a part of the total. In a developing economy agriculture is important in many respects. It must provide food and fiber for all of the people, not just the farm people. As agriculture grows and develops it must provide resources including labor, management, and to some extent technology, for the growth and development of the non-farm sectors of the economy. For example, as a textile industry develops it might draw from agriculture its raw product, and people for management and labor.

The leaders of a young and developing nation must realize that sound, long-range economic development must be built on realistic demand for products. Developing industries to produce for export markets and completely ignoring the (a) needs of the people at home, and (b) the instability of the foreign market, is risky indeed. Providing purchasing power so

that the goods produced in a developing economy can find a market is another important role that agriculture must play in the early stages of a developing nation. Nicaragua, like most developing nations, finds a very high percentage of its people engaged in agriculture. Therefore, farming must be well enough developed and prosperous enough that farm people can and will consume the products of the new industrial plants. It has been pointed out many times in many underdeveloped countries in the world that it is of no use to establish industrial plants to make products that no one can afford to buy.

A third and vital role that agriculture must play in a young and developing economy is to provide foreign exchange for the purchase of imports essential to the growth and development of the nation. For example, Nicaragua is dependent upon outside sources for tools, motors, vehicles, machines and many, many other items essential to the growth and development of its economy.

THE ROLE OF FOREIGN TRADE IN ECONOMIC DEVELOPMENT

Trade is based on the fact that there is variation in resources and the degree of development of skill, science and technology among people. Individuals trade because each assumes or thinks he will better himself by the exchange. The same is true for nations with the assumption being made that each nation will specialize in the production of those items for which it has a comparative advantage. The rules of trade may be modified internally or externally by the governing bodies involved. The point to be made here is that foreign trade may be crucial in economic development as would appear to be the case in Nicaragua. If motors, machines, vehicles, etc. are essential to growth and development then it becomes essential that some way be found to trade for these items. What should Nicaragua export to provide for essential imports? The answer to this question depends upon Nicaragua's ability to produce in competition with other countries and to get a reasonable share of the world market, either in the open market or through negotiated trade agreements, and on attitudes, policies and procedures dealing with the importation of goods and services.

THE IMPORTANCE OF PLANNING FOR AGRICULTURAL PRODUCTION

One of the many roles of government is to plan for the orderly growth and development of the economy. To enable private enterprise to function efficiently, government needs to create a climate that is conducive to efficient operation, orderly growth of production and demand, and wise use of national resources. The prime importance of the use of information on soils and other natural renewable resources is discussed fully in Appendix V, the Current Status of Basic Resources Information, etc. The creation of an environment which would be stimulating to business activity must take into account the availability, nature and value of all natural resources, stability of currency, tax policy, public education, the construction and maintenance of roads, the availability of credit, stability of prices, and the demand for goods and services. If one can depend on the above being handled logically or can make reasonable assumptions in regard to them, one can plan for agricultural production with confidence.

A group trained in planning and the development of agricultural goals can calculate with reasonable accuracy the needs of the nation for imports and exports, for consumption and for a reserve or carryover. Careful planning can lead to the establishment of goals based on realistic input information. For example, one can determine what it will take in the way of inputs and price incentive to attain a given goal. One can then judge whether it is reasonable to expect to obtain and utilize the required factors of production within a given period of time. Efficient production and distribution based on the knowledge of science, economics, and technology is complicated and requires careful scheduling of production and distribution processes. Unless a nation is able and willing to engage in such activity, its agriculture, industry and commerce stand little chance of attaining a rate of efficiency essential to a modern mature economy.

A SUGGESTED APPROACH TO INCREASED AGRICULTURAL PRODUCTION

To be realistic production goals must not only take into account the needs of the nation for consumption, development and export but must deal effectively with the practical aspects of the production and allocation of resources to the production and distribution of the many different items needed in a developing economy. Which production resources are relatively plentiful and which are scarce? The scarce or limiting resources are the ones which concern one most in the development of production plans. It is from these that one strives for the optimum return, because it is these factors that limit total output. For example, in the production of corn it is not likely to be land and labor in Nicaragua that limit production but those items the farmers must purchase such as high quality seed, fertilizers, hand tools, plows, cultivators, etc. In planning for production one should try to optimize the use of those items which must be purchased by the Nicaraguan farmers.

An effective approach to planning for increased agricultural production is to develop for each commodity a schedule of input-output response data. For some commodities it may be necessary to do this for several different situations which would take into account different regions of the country, different levels of technology, and different sizes of farms. As many different situations should be studied as are essential to the accuracy of the planning process. For example, suppose we wanted to double the total production of beans. Where and how would we plan for this activity? First, we would study present production experience to reconstruct present production patterns and practices. Second, for each widely different production pattern we would develop response data to show what would happen to production if recommended production practices were used. Third, we would determine the feasibility of expanding the acreage planted to beans. Fourth, we would estimate the extent to which it would be practical and reasonable to expand acreage, and to adopt a higher level of technology on acreage already devoted to the crop. An expert can get much valuable assistance from farmers and other agricultural leaders in making these estimates. Fifth, one would summarize the output based on response data, level of adoption, and increased acreage and arrive at an estimated total production figure. Sixth, one would appraise the need for a 100% increase in beans with the need for other commodities and the extent to which the

inputs required to double bean production might be needed to increase the production of other commodities.

The above process would be repeated for the major commodities and would be based on a careful estimate of the need for each. A careful analysis and summary of all inputs is essential to their attainment. This procedure is not free from the possibility of error but in the hands of an expert and with adequate time and resources it can yield surprisingly effective and accurate results. Above all it will bring to light many problems and much useful knowledge which can be used to avoid many serious errors and set-backs as a young nation moves forward.

In planning for increased production one must not stop at the farm level, but make plans for the grading, pricing, assembling, cleaning, drying, transporting and storing of the product until it is needed for processing and/or distribution to the intermediate or ultimate consumer or for export. The development of accurate production goals provides a sound basis on which to plan for marketing, processing, storage and distribution. Planning provides an opportunity to coordinate production and marketing. It settles the age old question of which comes first, the product or the market; it provides for both in an orderly and systematic way.

A crucial requirement for the attainment of specific production goals is the guarantee of a market at a minimum price. The planning group can estimate the amount of production that would result from a specific minimum price. If the market remains above the minimum price the farmer could sell his product on the open market. If the free market price drops below the minimum price guaranteed by the government agency operating the program the farmer could sell to the agency for the minimum price. A very effective program is being operated along these lines for corn, rice, beans, coffee and a few other commodities by the price stabilization agency (INCEI). In this way every farmer could be assured of a market for his product at a guaranteed minimum price. This feature is extremely important in terms of the farmers' response to a call for increased production.

Increased production is dependent upon increased inputs, therefore, a definite plan must be worked out and put into effect to provide the farmer with the needed inputs at the right time, and at reasonable prices, and on terms he can afford. Providing input factors may have to be a function of government in the beginning stages, but can usually be turned over to private enterprise as soon as the routine is well established. Government handling of farm supplies and government support prices should be handled so that in the long run the free market will survive and the Government can withdraw. It would be very unfortunate if a situation developed in which the government replaced private enterprise in the market place. There is a considerable evidence that the Nicaraguan Government has a good understanding of the role of government in a free enterprise economy as demonstrated by the fine performance of INCEI and the Development Corporation (INFONAC) in this regard.

The procedure discussed above can be used to evaluate potential opportunities for new enterprises. Also, the procedure will be useful in evaluating situations involving imports, exports and Central American Common Market (CACM) trade. It is well to point out that economic opportunities change with changes in science and technology and with changes in the economic rules of the game. Timely and periodic evaluation of economic opportunities will provide the young, vigorous nation with a tremendous advantage in meeting competition in the market place and in sustaining a desirable rate of economic growth.

4. MARKETING ACTIVITIES

Any organized program for agricultural marketing in Nicaragua will depend on developments in three major areas during the next few years. In each case, careful consideration of the elements of a marketing program should anticipate, as much as possible, the production or probable movement of commodities in each area.

A. Central American Common Market

As indicated in the section on Agricultural Goals and Economic Development so much of Nicaragua's activities are so closely related to the determination of the location, value, and volume of commodities covered under the Integrated Common Agricultural Policy (CACM) that much planning needs to be done quickly so that Nicaraguan agriculture will be prepared to take its place in the new market organization with a minimum of delay once these policies have been delineated.

B. The Marketing of Agricultural Export Commodities

Since a large percentage of the exports of such commercial commodities as coffee, cotton, meat, cottonseed, bananas and sugar, and possibly tobacco and new export crops will go to markets outside of the CACM, a closer internal coordination of market planning may be necessary.

C. Marketing the Products of Small Producers

The production of crops and livestock products by small and medium producers and any marketable produce which results from agrarian reform activities is likely to be in large measure for local consumption. Even so, products as corn, rice, beans, dairy and poultry products will be affected to some degree by CACM policies.

It should be emphasized again that planning for marketing should be coordinated with planning for production (see Agricultural Goals and Economic Development).

From the above brief discussion, it may readily be seen that the exact nature of the type of marketing activities which will be needed depends on the interrelated policies and activities in the field of agricultural production and supply which will be determined in the future. Accordingly it is proposed that until further definite needs become apparent,

the marketing advisory activities be the responsibility of the agricultural planning expert recommended elsewhere and the AID specialist in cooperatives.

5. AGRICULTURAL CREDIT

This section of the report will be limited largely to a discussion of credit with some references to related subjects and some recommendations for improvement in the agricultural sector.

The importance of credit in the accumulation of capital for use in acquiring basic resources -- land, livestock, equipment, etc., -- as well as operating capital in carrying on a modern farm program cannot be over emphasized. It is a valuable tool which can stimulate agricultural production which is especially needed in Nicaragua for domestic consumption and export. Credit can become one of the most useful tools in implementing the Agrarian Reform program which is in process of development and, unless it can be made available in increasing amounts, this movement might well become only a dream for many needy and worthy rural families.

Any program of rural community development must have as its aim broad participation on the part of all farmers in a type of agriculture which provides for efficient use of the rural labor force, for proper conservation and use of all resources, and for an improved standard of living which means better diets, more education, better medical service, more adequate housing, etc., and for active participation in the economic, educational, social, and political life of any nation. The latest information available indicates that in Nicaragua 72.2% of the farms are smaller than 87 acres and that these farms constitute 15% of the total farm land. It appears that reasonably good credit is available to the larger, more efficient farmers, that some, but not enough, is available to small and medium-sized farmers and that little or none is available to non-owners except on usurious terms. Such credit will not promote real economic development of the type desired by increasing the productivity of the masses.

Agriculture is by far the most important industry in the country. In 1954, it accounted for 85% of the value of the total exports. Provided with proper education and technical farm management advice, plus credit to meet the needs of the people in farming especially, the small inefficient farm operators can contribute even more to the total economic life of the country.

Tremendous strides are being made in bringing modern transportation and communication to the country. This will have much influence in awakening in the people a desire for improvement in all areas of life. Unless this awakening is met with earnest efforts to provide opportunities, serious social and political problems might be the result.

In the area of agricultural resources and practices, wide variations are to be found. Resources and practices are noted which compare favorably with those in the highly developed countries. On the other

hand, the vast majority of the small farmers are struggling along with very simple farm tools, using primitive methods on a land base which is inadequate, judged by any reasonable standard.

Discussions with officials of the National Bank of Nicaragua and a study of their publicity material, loan forms, policies, and statistics indicate that a beginning has been made in a supervised credit program which is essential if the masses are to have an opportunity for improvement and real participation in an expanding economy. This bank program has been operating for many months with a loan of \$2,500,000 from BID. According to statements made by the officials of the bank, collections are expected to be good and significant changes are being made in the farm practices of borrowers. This program is aimed in the right direction, but some questions can be raised as to present policies and program, e.g.:

Are sufficient funds available to meet the total agricultural credit needs?

Are the eligibility standards sufficiently flexible to permit loans to those farmers who have limited collateral?

Can security requirements be modified to permit loans to those farmers who own no real estate or who cannot get proper endorsement, yet they have good production records and can use credit to good advantage and repay loans?

With 72% of the farms being smaller than 88 acres in size and with 60% of the population living in rural areas, it can be assumed that a much larger volume of credit is needed to meet the needs of the small and middle-sized farmers. Without a doubt, much of the credit being used by the farmers in greatest need is not adequate in terms of amount or with respect to rates and terms. Eligibility requirements need to be changed to permit loans to non-owners without endorsement, as well as to make loans more readily available to owners of extremely small farms and those who own a house site only and rent their productive land.

The security requirements seriously restrict the availability of credit. Credit for many small farmers must be considered more on the basis of the honesty and integrity of the borrower and his ability to produce than on real estate or endorsement security. Present regulations of the bank do not permit loans on second mortgages. This will require modification especially in the irrigation area at Rivas or the farmers in that area will be excluded. The reason for this is that the entire area within the project will be covered by a first or superior mortgage to secure the loan which makes possible the development.

One of the most obvious needs observed by the team is in the field of rural housing. Adequate housing or shelter can be provided at minimum cost. Emphasis should be in providing more space, better sanitary facilities, and safe water, together with improved cooking facilities. A beginning has been made in promoting a latrine program, but it is only

a beginning, and must be greatly expanded if this program is to benefit the masses in the foreseeable future. Such a program will of necessity require the cooperation of health, education, and credit people. House and related plans for outbuildings, latrines, water supplies, etc., embodying minimum standards should be made available for free distribution.

An improved agriculture on the part of the masses will depend to a large extent on education. The approach here will of necessity be twofold; namely, formal education primarily for the youth of the country, and a program of adult education. Formal education of the youth, even if it were available to everyone, is deficient in many places; therefore, a program of adult education of a type that will meet the needs of the illiterate will be required. Recommendations covering education will be found in another section of this report.

Before formulating any recommendations for an improved credit program, it will be well to look at some basic considerations on which a sound and comprehensive credit program, especially for small and medium-sized farmers, must be based.

1. The amount of credit available must be sufficient to meet the needs of large numbers of farmers who need to improve their levels of living and thereby be encouraged to participate more actively in the democratic process. When this is done, a sizable volume of agricultural production will be released for export.
2. Credit must be tailored to meet the needs of individual farmers. For example, different rates and terms must be available for annual recurring operating costs, for land purchase and development including housing, fencing, irrigation, pasture development, etc., and for the purchase of livestock and machinery. The credit must be available readily when needed with the time required for processing the loan application measured in terms of days and not weeks or months.
3. Credit must be extended on the basis of expected production, as well as on the basis of real estate security and endorsement. Farmers who are honest, who are able physically to work, who have experience and/or know-how, or can get it by technical supervision, and who have a desire to improve their economic position can be expected to make good credit risks. Evidence of these qualities can be had by the use of a local committee of persons of good judgment and a desire to render a public service which will benefit not only the farmer but the entire community. These committees should be composed of non-borrowers in order to prevent embarrassment and to avoid charges of favoritism.
4. There must be a complete understanding as to the purposes for which the credit is to be used, the security to be given, and the date and source of repayment. Loans for cash crop production should have a due date to coincide as nearly as possible with the marketing time and repayments should be made as income is received.

5. A detailed farm and home plan, including an inventory, financial statement, plan of operation, estimate of income and expense, credit needed, improvements to be made, and repayment plans should be prepared and agreed to by the borrower and lender. This should be done after a visit to the farm by the agent of the lender with the applicant. During this inspection of the farm, a determination should be made as to proper land use, soil conserving practices to be followed, etc. Any change in the situation or plan should, of course, be agreed to also.
6. Needed technical information should be provided by the person making the loan and collections should be made by the same person. Any other system of providing technical help affords an opportunity for misunderstanding and confusion. It is assumed, of course, that the lender or agent will secure the technical information from recognized sources and will call in experts as needed on matters requiring more than average competence. This will require a close working relationship between the Experiment Station, College of Agriculture, Extension Service and others who have any responsibility for furnishing expert advice.
7. Technical Supervision should be given based on the needs of the individual borrower. In most cases, this will mean a minimum of two visits during each crop season. In other cases, it may mean five or six visits.
8. Technically trained personnel must be available, that is, trained in farm management, production, marketing, etc., as well as the principles of sound credit. Such personnel must be recruited and selected on the basis of ability and interest in helping farmers and rural people -- never on the basis of friendship or political patronage. Trained personnel for this work does not necessarily require a degree in agriculture, but this should certainly be one of the longtime goals. Some comment and recommendations regarding this will be made elsewhere in this report.

Efforts to obtain full information on the amount of credit available have not been completely satisfactory, largely because of limitations of time. It can be assumed, however, that the following sources of credit are available:

The National Bank of Nicaragua
Individual money lenders
Banco Nicaraguense
Bank of America
INFONAC

The National Bank of Nicaragua has been carrying on a program of supervised rural credit for several years following a plan which was developed by the Bank after a member of their staff spent a year studying in the United States. For several weeks he worked with the Farmers Home Administration people in North Carolina and patterned the Bank's program on the FHA program in the States.

Two sources of funds are available; namely, regular bank funds and proceeds of a BID loan of \$2,500,000 negotiated in 1962. The first loans from the BID fund were made in March 1963. To date, less than 800 loans have been made for a total of \$245,499. Few loans have matured, so information as to the amount of interest collected and delinquencies is not yet available.

The cost of operating this program is rather sizable. The cost in 1963 for 70 employees was \$266,687 which includes all costs. Salaries alone accounted for almost \$200,000.

The amount of Bank funds going into agricultural and livestock credit in 1963 was something more than 14,000,000 cordobas, or \$2,000,000.

The combination of BID loan and Bank funds going for all rural credit accounted for only about 5% of outstanding National Bank loans. This seems rather small in comparison with the large number of farmers who are in position to make good use of more credit for the acquisition of basic resources.

Information as to the amount of credit furnished by individuals is not available, but it has been stated on good authority that this type credit is available on rates and terms that are usurious in all respects. For example, interest rates are reported to run as high as 5 to 10% per month with penalties added for renewal. Terms seldom run longer than one year.

Presumably, the Banco Nicaraguense is making a very limited number of agricultural loans as is the locally owned Bank of America. It appears that credit available from INFONAC is aimed largely toward industry, including agricultural processing, and will not be very important in the future as a source of credit for individuals unless drastic policy changes are made, or a new division established. The Central Bank of Nicaragua is designed to provide credit for the purpose of stabilizing prices.

The conclusion is, therefore, justified that there is a shortage of the type credit needed to promote an increase in production on the part of a large portion of the rural population.

CONCLUSIONS AND RECOMMENDATIONS

1. After giving serious study and due consideration to the discussions with many people in and out of government, bankers, agricultural workers, farmers, and others, and observing the quality of agriculture on many farms, it is concluded that one of the great needs in the agricultural sector is a source of adequate, dependable credit, designed especially to meet the needs of the small and middle-sized farmers.
2. With such a program, the families in this group can adopt modern farm practices, increase production which will raise incomes and

improve family living standards, as well as release a considerable amount of agricultural production for export. This type of credit will of necessity require technical supervision. The supervision referred to is similar to that given to Farmers Home Administration borrowers in the United States. Credit is combined with technical assistance in an effort to assist needy and worthy farmers who are operating inefficiently to secure and use properly the needed resources -- land, livestock, farm tools, including machine powered equipment where justified, fertilizer, seed, etc., - so that fullest possible use may be made of family labor in a combination of enterprises which will bring the maximum return in terms of family income.

This is, in effect, more than a credit program. Much of it can be considered an adult education effort and, as such, is deserving of public financial support. The cost of administering such a program will exceed the interest income; hence, the need for some form of subsidy.

A program such as this may never reach all those farm and rural families who need more income and educational help. However, such help for those who can make improvement and repay loans will remove them from the need for some kind of charitable or welfare assistance, or a permanent substandard living. By means of a good supervised credit program, many families can be tied to the land in such a way that more stability will be the result.

3. The credit presently available through the National Bank - BID loan - although aimed in the right direction, is not reaching enough people, and it is questionable whether it ever will, under present banking regulations. While it is anticipated that supervised credit will be extended on the basis of sound credit principles, it must be understood that certain risks must be taken and many loans will be made on the basis of security which does not meet conventional banking requirements.
4. Technicians are not available in sufficient numbers to handle a large program immediately, but the program will need to be expanded as rapidly as credit technicians can be properly trained in farm management and credit principles.
5. The best way to provide a system of supervised credit for small and medium-sized farmers is through a new agency created under authority of the Agrarian Reform Law. By establishing a division of supervised credit in this autonomous agency, the National Bank would be free to continue its loan program of rural credit (except that part which uses BID funds) handling those applications which meet banking standards. The new agency could then take those of higher risk, who cannot qualify for conventional credit, assist them to improve their farm operations and economic position, and within a few years, possibly three to seven, they could be referred to the Bank or some other conventional lender.

6. Such a program should be financed by a loan from one of the international credit agencies with a commitment on the part of the Government of Nicaragua that the cost of administration, above earnings from interest, as well as losses on loans, will be underwritten. This may seem as though the government is assuming a heavy responsibility, but in reality it is not since the borrowers are likely to pay increased taxes which will add to the government's income. Soon this increase will offset much of the added government cost.
7. This program should have as its goal helping thousands of families within a period of a few years. Such a program will require one trained agricultural credit technician for every 100 to 150 families being supervised. The rapidity with which such a program can be expanded will be directly related to the number of technicians who can be recruited and/or trained. Presumably, it might be possible to find enough qualified people to open offices the first year in from four to eight of the more important and heavily populated farming areas. In an effort to provide well trained technicians, from three to five good recruits should be sent to the United States each year for the next five years for study with the understanding that they will return to Nicaragua and work in the supervised credit program. By the end of five years, a training program in Nicaragua should be turning out enough graduates to meet the need.
8. One full-time credit adviser should be assigned to Nicaragua as soon as the Government of Nicaragua appoints a counterpart. It would be his responsibility to advise in setting up a new or expanded program, developing policies, procedures, forms, job descriptions, and other matters having to do with the efficient operation of such a program. This adviser should remain for a period of two years and should give preferred attention to training a Nicaraguense to take over the overall supervision and direction of the program by that time.
9. The transfer or sale of the present National Bank BID program to the new agency should be arranged at the earliest possible date. A proposal to this effect should be made a part of a proposal for the loan made to the International Agency.

Financing the administration of the new agency from loan proceeds should also be provided pending the accumulation of an administrative fund to be provided from a 1% charge added to the interest rate on each loan. The interest rate on loans should not exceed 6%, including the 1% referred to in this paragraph. Loans for major farm development should have provision for deferred payment pending full development.

10. The cooperative method of providing heavy equipment, community services, processing, marketing and purchasing facilities, can become an important part of an overall rural community development program. Any credit program, such as the one proposed, should provide for loans to individuals to purchase stock in existing or proposed cooperatives.

11. The farmers who require credit, regardless of amount, should begin to plan for a system of cooperative credit under which groups of farmers would organize, develop and manage their own financial institution similar to the Farm Credit groups in the United States. Such a program might well begin with a series of rural credit unions which are presently being promoted in the country by CUNA.
12. The success of the Agrarian Reform Movement will be determined largely by the availability of adequate credit, both short and long term, and the availability of technically trained farm management supervisors. With public lands and technical supervision available, this program might become a major factor in establishing landless farmers on good economic farm units, using a minimum amount of long term credit. Of course, there are many "if's" to be considered, such as the availability of roads, schools, and other community facilities. Recommendations concerning these facilities are covered elsewhere.

6. AGRARIAN REFORM IN NICARAGUA

Nicaragua's Agrarian Reform Law became effective May 19, 1963, and it is likely that its supplementary regulations will soon be approved by presidential decree. The law establishes an Agrarian Institute as an autonomous agency to administer and coordinate all phases of the program which is scheduled to go into operation on July 1, 1964. It is to be under the general control of a Directive Council (the Council) composed of the President of the Institute, the Minister of Agriculture, the manager of the Banco Nacional, and one representative each of the campesinos, of the agricultural associations of the country, and of the Minority Party. The last three representatives as well as the president of the Institute are to be appointed by the President of Nicaragua. Both the sub-director and the Auditor of the Institute are to be appointed by the Council.

The provisions of the Law appear to be based on careful consideration of the experience of other countries, but are clearly tailored to meet Nicaraguan conditions. The Law is intended to emphasize the importance of agrarian reform and to: improve the national economy, raise the standard of living of the farm population including the farm workers, make possible a sound system of land tenancy, and create a system conducive to initiating a process of self help. Generally sound and comprehensive, it is intended to provide all of the tools basic to a sound program.

The team believes that the long term success of the Agrarian Reform Program depends upon the extent to which the present concept can be expanded to service all of the low income rural people of Nicaragua. Of far greater long time significance than colonization is the development of a supervised credit program for low income farm people. Such a program would provide them with technological and economic information and the supervision essential to the wise use of credit. The development of many small units into well organized and carefully managed individual

farms would not only improve the level of living of these people but would contribute in the long run to their growth, development and stability of the people and to that of the total economy. Specific recommendations for Agrarian Reform programs are:

1. That emphasis in the development and execution of the Agrarian Reform Program be shifted from colonization to providing credit and supervision to all low income people. This does not mean that colonization should cease but that the concept of Agrarian Reform should be expanded to render greater service and place development on a sounder and more practical basis.
2. There should be carried out a clear and comprehensive program of land titles applicable both to qualified campesinos or squatters throughout the country and to colonists, who have fulfilled the Law's requirements. This is not only essential to the small farmer's feeling of security, but to his ability to establish a sound basis for credit and supervision.
3. The principle of giving first priority to the use of G.O.N. lands should be closely adhered to. This would avoid public criticism and costly disputes over the value of land to be purchased. It would also avoid the need for payment of funds needed for the program.
4. In compliance with item 3, the purchase or acceptance of donated lands (often title clouded) should be stopped or slowed to a minimum. Similarly, the taking over of unsuitable projects already proposed should be slowed to a minimum. Those colonies which already are the responsibility of the Agrarian Institute should be made to conform to the provisions of the law as soon as possible.
5. Before each new colonization project is initiated:
 - a. It should be based on a review of all available information on natural and human resources within a given area.
 - b. Following the location of a colony, detailed plans of area and colony design should be carefully developed before families are selected and settled.
 - c. Each family farm unit should be carefully planned to provide sound management and clearly drawn boundaries for title purposes.
6. The program of supervision and credit should be comprehensively planned and carried out until the colonists develop into sound commercial farmers.

In addition to the mechanisms for carrying out colonization, provisions should be made for incorporating the supervised credit program recommended. Specialists in other problems relating to agrarian reform could be requested as provided in section 1 above and appropriate specialists could be obtained as needed.

7. MISCELLANEOUS ACTIVITIES IN RURAL DEVELOPMENT

This section is intended briefly to regroup certain activities relating to rural community development for which provision was made in earlier sections and to discuss a proposed program for penetration roads. The possibility of incorporating Title II PL 480 foodstuffs through the voluntary agencies is discussed.

A. Community Development

It is understood that a nucleus for community development is being formed in many communities by the Extension Service and by being visited by the Mobile Health units in which initiative, to construct medical centers and other community improvements, has been in large measure spontaneously developed. This beginning would be supported in homes and gardens by initiating and continuing the program of trainees in home economics proposed in Section 2 (education, etc.). The work would subsequently be broadened by the proposed inclusion of vocational agriculture in secondary schools. If the program of Penetration Roads referred to below proves to be successful, it is possible that the Food for Peace program might be expanded to include sanitary works, schools and other community buildings, streets and county roads.

B. Cooperatives

The agrarian reform law set forth sound principles of cooperative development such as those contained in the Rochdale plan and it is the clear intent of the present government to protect these principles. Most of these activities will be developed under the rural cooperatives program of AID. This proposal would support this activity, especially in credit and marketing through the training of local extension personnel to backstop any later support by agriculture technicians under TDY.

C. Penetration Roads

The excellent program of the Highway Department, Ministry of Public Works in major arterials, secondary and farm to market roads deserves the continued support of AID and of the Agricultural Mission herein proposed. In much of Nicaragua additional roads are essential to economic development. Roads not only provide for transportation of people, goods and services and make it possible to market farm products, but they provide a spark of hope and enthusiasm essential to progress.

Penetration roads open up a whole new world to those farmers affected, therefore, plans should be made to provide the technical and economic information needed by these farmers to change-over from subsistence to semi-commercial farming. Not only do these farmers need new knowledge and supervision, but they need capital to finance their new venture into market economy. This means that credit as well as educational assistance should accompany the spread of penetration roads.

APPENDICES

APPENDIX I

1. Assumptions

In preparing this report, the team has made the following assumptions:

- a. That business activity for the commercial and industrial segments of the economy will continue to increase and that gross national product will continue to exceed the equivalent of \$400 million annually.
- b. That the value of exports will increase during the period 1964-68.
- c. That if these two conditions are met, they will insure Nicaragua's ability to finance its program by obtaining foreign capital and investments.
- d. That the CABEI loan program of approximately \$4.7 million for a detailed survey of natural resources for property tax and other purposes will be activated in the near future; that this and other programs to improve the equitable and complete collection of taxes will be successfully concluded.
- e. That there will be no major change in foreign policy and that progress toward a common Central American policy continues.
- f. That the country will continue its evident progress toward free speech and freedom in economic endeavor, and that there will be no major change in the country's political, social and economic structure.

APPENDIX II

ABBREVIATIONS AND AGENCIES (NICARAGUA)

- A.I. - Agrarian Institute (Instituto Agrario) Administers Agrarian Reform Law
- B.C. - Banco Central de Nicaragua - Important in determining economic policy
- BN or BNN - Banco Nacional - Autonomous lending agency of GON
- CABEI - Central American Bank for Economic Integration
- CACM - Central American Common Market (of the Economic Integration of Central America)
- EEA - Agricultural Experiment Station (Estacion Experimental Agropecuaria)
- ENAG - National School of Agriculture (Escuela Nacional de Agricultura y Ganaderia)
- GON - Government of Nicaragua
- INCEI - The Agricultural Price Stabilization Agency (Instituto de Comercio Exterior e Interior)
- INFONAC - The National Development Institute (Instituto de Fomento Nacional)
- ITAN - Proposed Autonomous Service (Instituto de Tecnologia Agropecuaria de Nicaragua) to be comprised of EEA, ENAG and SEA
- MAG - Ministry of Agriculture (Ministerio de Agricultura y Ganaderia)
- NEC - National Economic Council - The principal body on economic policy
- NPO - National Planning Office, Secretariat of the NEC
- SEA - The Extension Service (Servicio de Extension Agricola)
- STAN - The joint U.S.-Nicaraguan Agricultural Service (Servicio Tecnico Agricola de Nicaragua). Dissolved in 1958.
- UNSF - United Nations Special Fund
- Vo. Ag. School - Catholic School at Rivas (Escuela Internacional de Agricultura y Ganaderia)

APPENDIX III

EDUCATION AND RESEARCH IN AGRICULTURAL DEVELOPMENT

BACKGROUND

The research and education activities were supported in the Ministry of Agriculture (MAG) under a cooperative Nicaragua - U.S. Servicio called STAN from 1950 to 1958. Under that agency there was organized the Agricultural Experiment Station at LaCalera. In the same period the National School of Agriculture was supported in increasing its faculty and physical facilities to offer a $4\frac{1}{2}$ -year Ingeniero Agronomo degree in lieu of the 3-year Perito Agronomo degree offered formerly, and the Extension Service was supported and patterned after the classical U.S. extension service system. In 1958 there was a strong sentiment in U.S. AID to turn over the operation of the activities of STAN to the Nicaraguan Government. At the same time there developed within the MAG a desire to discontinue U.S. assistance and a request was made for the withdrawal of essentially all U.S. personnel in agriculture. These moves marked a serious decline in the quality of the services to Nicaraguan agriculture and in the level of budgetary support which these agencies received.

In the intervening six years there have been several very important and contradictory developments:

- a) There has been a rather high amount of political interference in the appointment of personnel and in the management of budgets. This has resulted in a serious decline in morale and in the loss to other agencies of almost all of the competent technicians from MAG.
- b) There has been an almost complete close-out of research in agriculture, leaving the rather well equipped physical plant at La Calera almost static in terms of research projects. There is still a reasonable sized staff of inadequately trained personnel, but essentially no operating funds are available on an effective basis, so that very little useful activity is even planned. The Agricultural Extension Service has suffered a parallel loss of qualified personnel and operating budget.
- c) The National School of Agriculture has 15 professors, only 4 of which are full time, and they graduate only about 10 students per year. There is an alarming loss of students during the first year, ranging up to 70% of those matriculating.
- d) There seems to be a general loss of public confidence in governmental action through Ministerial channels, and this results in a reluctance on the part of the Congress to appropriate increased support.
- e) There has been a remarkable development of competence in autonomous and private agencies serving agriculture. Most of

the outstanding agricultural leadership in the country is presently found in these agencies. Such agencies as INFONAC, Banco Nacional, INCEI and others are undertaking services to agriculture that are efficient, and what is even more important, are oriented toward stimulation of private enterprise.

- f) The vocational agriculture instruction formerly undertaken by the National School of Agriculture is now performed only by the poorly supported International School of Agriculture at Rivas, operated by the Dominican Fathers.

EVALUATION OF THE PRESENT SITUATION

A brief review of the agricultural development during recent years points up several self-evident facts. Three of these are described below as being fundamental to suggested certain modifications in the present structure and program of the MAG.

1. Shortage of qualified personnel is the greatest single deterrent to the introduction of modern technology into the agricultural development of the country. Every visit or interview made by the team pointed up the urgency for developing a substantial corps of trained personnel at all levels as a prerequisite to almost any other moves. It would be difficult to say whether the shortage were more critical at the senior leadership level or at the "capataz" level, since all levels are exercising severe limitations on agricultural development. It is probably true that the major national sources of information and training -- the Experiment Station, the School of Agriculture and the Extension Service -- are the keys to any solution of the problem and hence deserve first priority.
2. Insulation from political patronage is a prime prerequisite to scientific development. This fact is amply documented by the recent unhappy history of the Experiment Station, the School of Agriculture, and the Extension Service. Nicaragua's economy is heavily dependent upon export of agricultural products, but international trade can only prosper if it is based on modern scientific and technological methodology that is comparable to that employed by its competitors. Scientific development cannot be achieved by political influence nor can its integrity be protected when personnel are managed on any basis other than merit. Scientific development requires continuity of personnel and effort and a climate of stability. Investment of resources in any program which does not enjoy this protection is completely wasteful and can only lead to disappointment by those agricultural producers who are depending on scientific backstopping for their own success. It is because of this fact that the major portion of scientific and technological development in Nicaragua today is found in autonomous or private agencies rather than in the MAG.

3. Much larger support from the National Budget for agriculture is necessary if it is to continue to be the backbone of both the internal and external economy of the country. Agriculture must continue to be considered as the basic working capital of Nicaragua for many years to come. It is generally recognized that present exports of cotton and meat are quite susceptible to the vagaries of International trade. Continual improvements in the efficiency of production must be made if this country is to anticipate a relatively steady income of foreign exchange through the coming years. History assures us that once a foreign market is lost, it is almost impossible to reclaim it. Therefore, problems which normally arise in the production and export marketing of those commodities must be anticipated and solutions developed before serious damage befalls them. Such insurance cannot be purchased with the present budgetary support. Outside assistance can only be regarded as a temporary measure which can place these activities on an adequate level of operation, but the maintenance of such programs and especially the personnel involved must be supported from national resources.

AGRICULTURAL SERVICES

The three institutionalized services to agriculture are University level teaching, research and extension. Each of these are now administered directly under the Minister of Agriculture as shown in the organizational chart attached. Following is an evaluation of their present status and future potential.

Despacho del Ministro

Despacho del Vice Ministro

Despacho de la Oficialia Mayor

Direccion Administrativa

Asuntos Administrativos

Inspeccion General de Agricultura y Ganado	Escuela Nacional de Agricultura y Ganaderia	Estacion Experimental Agropecuaria (La Calera)	Servicio de Extension Agricola	Resources Naturales Renovables
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1. Cuarentena
vegetal y
animal

1. Division Agricultura

- a. Agronomia
- b. Horticulture
- c. Suelos
- d. Cert. semillas

2. Campanas de-
fensa Agricola

2. Division Ganaderia

- a. Zootechnica
- b. Veterinario
- c. Estudios Economicos

4. Inseminacion
Artificial

3. Division Servicios
Especiales

- a. Quimica
- b. Ing. Agricola
- c. Pestes Agrícolas

5. Venta Productos
veterinarios

6. Registros y
autorizaciones

The Agricultural Research Program. The role of agricultural research is to provide leadership and stimulation to the rapid introduction of technological and scientific innovations in agricultural production. Such a role requires the very best possible corps of scientists who are continually up to date on the scientific advances elsewhere in the world and whose total energies are devoted to their economic integration into the agricultural activities of this country. It is almost axiomatic that the poorer the country, the better trained will their agricultural scientists need to be. There is a tendency to orient the efforts of research to exotic, peripheral or theoretical subjects, when the greatest need is to discover solutions to the serious limiting factors to production and marketing of the major food and commercial crops of the country. There is also a tendency to scatter research efforts and facilities so thinly among a myriad of projects that no single result is obtained which has impact on the agricultural economy. It is perhaps politically expedient to have a small project on every conceivable problem, but there is no more certain road to complete ineffectiveness.

The present research program of MAG has many serious deficiencies, most of them resulting from the factors discussed above. These deficiencies, as suggested before, are primarily related to a) trained personnel, b) operating funds and c) autonomy of action.

- a) The present personnel of the Agricultural Experiment Station include very few who have the equivalent of a strong B.S. degree and only one who has the equivalent of an M.S. degree. Since research results, whether applied or theoretical are primarily the product of mental processes of examining problems, thinking of appropriate solutions, and evaluating possible conclusions, the mental power available to research must be the first and most important consideration. There is nothing to be gained by supplying equipment, land and facilities if there is inadequate mental preparation to take advantage of it. An experiment station which discharges properly the heavy responsibility which La Calera nominally has in Nicaragua should have at least a M.S. degree in charge of each division and department. To attempt to get along with less is to disillusion both the research personnel themselves and the agricultural population that depends on them. If there were a program of training and recruiting, the salary scale would have to be materially strengthened to hold the better trained staff once they were available.
- b) The budget for La Calera last year showed 2,667,800 cordovas for salaries and wages and 745,000 cordovas for total operations. This is a very low proportion for operations, especially when it should be necessary for much of the effective research to be done away from La Calera. The most damaging features of the budget, however, are its inflexibility and timing. The sub-items of expenditure are specified in the budget by the National Congress and no flexibility is permitted. This results in an almost complete waste of expenditures. The funds are made available in equal

monthly allocations, in spite of the fact that there are 6 months of heavy field activity during the winter and 6 months of much lower costs during summer. It would not be very hazardous to suggest that a 50% increase in effectiveness could be realized from the present budget merely by altering administrative procedures. Nicaragua is not in a position to afford such inefficiencies.

- c) A serious shortage of qualified personnel, coupled with low salaries, insecurity and administrative restrictions, is always conducive to having most of the decisions made in a central place. This inevitably erodes personal initiative, scientific inquisitiveness, and general morale. This has happened in the extreme at La Calera, resulting in a serious loss of the best personnel to other agencies or to private enterprise and an almost total absence of enthusiasm and initiative among those who remain. There is almost no sense of concern for the major problems of the nation nor a burning desire to resolve them. On the contrary there is such a lassitude and despair as to almost warrant closing the station until improved administrative procedures can be found.

One notable exception to the above comments is found in the Division of Agricultural Economics Studies. While nominally a division of the Experiment Station at La Calera, it is physically located in Managua in the MAG and has little contact with the rest of the Station. This perhaps insulates it only slightly from the problems described above. The Director of this Division has a Masters Degree in Agricultural Economics from Wisconsin and he is a shining light in the MAG. This division has a program of collection and weekly publication of prices of agricultural products that is quite helpful in spite of its inadequacies. The head of this Division is also acting in charge of the agrarian reform program, and these additional demands on his time have precluded any serious attack on the many problems needing research in this field.

THE AGRICULTURAL EXTENSION SERVICE

The Agricultural Extension Service opened its first office in 1951 and at present there are 15 offices in operation. The organizational pattern of each office is basically the same as that found in the United States, namely an agent in charge, an assistant agent, and a home demonstration assistant. There are two subject matter Extension Specialists and two supervisors. The project planning and activity reporting is also very familiar to U.S. visitors, and the true philosophy of Extension abounds from the Director down to the office boys.

The Extension Service has responsibility for printing all publications in the MAG; they issue a popular monthly bulletin titled "Nuestra Tierra", and they supply timely topics and articles to the daily press and radio.

The problems and deficiencies of the Extension Service are the same as for the other agencies of the MAG. Administrative restrictions, low salaries, political interference, very small operating budgets, very inadequate vehicles, and in addition, a serious dearth of technical information to "Extend".

The Director has a Master's degree from Iowa State and should be commended for his effectiveness in maintaining the procedures and philosophy established by STAN many years ago, but it is clear that he cannot continue to do this under existing circumstances. No new vehicles have been added since 1954, very few of the old group of agents who were well trained and highly motivated remain, the budget has remained the same since STAN, field projects are slowly closing down one by one.

The work of the Service is primarily oriented toward youth and adult clubs, cooperatives, and general information programs by radio and press. It appears that fairly effective work is being done among a small fraction of the campesinos and some medium size coffee and fruit farmers.

It is probable that few if any large commercial farmers are affected by the Extension Service today. They depend instead in increasing numbers on private enterprise that are organized to give, for an annual fee per hectare, regular inspection, technical advice and in many cases actual application of fertilizers or pesticides. This latter group in turn depends almost entirely on commercial supply houses for technical information.

A Tropical Station was established at El Recreo by the U.S. and Nicaraguan Governments in 1942. This station was of interest primarily during the war when sources of rubber, quinine, barbasco, etc., were in doubt. However, U.S. interest faded at the close of the war and Nicaraguan interest has declined to simply a care-taker action. The facility is administered under the agricultural Extension Service and no projects are being actively prosecuted there at present. The Rama Road which has just opened is an excellent all weather road that links river traffic from the Atlantic coast with the highly developed Pacific area. The opportunity for this station to serve an important function in Nicaraguan agricultural development is only now becoming real with the opening of the road.

VOCATIONAL AGRICULTURE

The use of University graduates in many of the agricultural services, especially with illiterate farmers and in more remote areas, is a luxury that can be afforded by few, if any less developed nations. Therefore, the vocational agriculture training that is available to extend the usefulness of the small number of Ingenieros Agronomos is particularly important in such societies. The present facilities for vocational agriculture in Nicaragua are very meager and consist solely of one poorly supported school operated by the Dominican Fathers at Rivas.

The Escuela Internacional de Agricultura y Ganaderia at Rivas accepts boys after the completion of 2 years of high school. The curriculum consists of a broad list of practical courses in agriculture for 3 years, at the end of which they receive a diploma as "Perito Agronomo". The number graduated each year is about 40. This program is very deficient in professional talent, in facilities and in support. The diplomas awarded are not recognized by the Ministry of Education and hence lack some degree of respectability in the minds of many. Their graduates are accepted, however, by various governmental agencies, including MAG, and certainly many of them perform quite well.

The curriculum of the public secondary schools provides for one course in the second year called "Practica de Agricultura y Ganaderia", there is no other instruction in agriculture which can prepare the very large numbers of sub-professional assistants needed by the institutional and private sectors of agriculture.

In the absence of persons trained in vocational agriculture the functions which this group performs in other societies are relegated in Nicaragua either to unskilled labor or to scarce and expensive Ingenieros Agronomos. Neither of these is able to satisfy the needs of the country.

RECOMMENDATIONS

The evidence is clear that there was at one time a very effective organization (STAN) which was capable of meeting many of the needs of an evolving agricultural economy in Nicaragua. The demise of that organization and the subsequent deterioration of the services it performed suggests that an appropriate path to recovery should include many of the features of the earlier system. Clearly reorganization alone will not satisfy all needs, but some reorganization is a necessary concomitant to any other steps if they are to be undertaken successfully.

Instituto de Tecnologia Agropecuaria de Nicaragua

A proposal was recently approved by the National Economic Council for submission to the U.N. Special Fund for assistance in agriculture. This proposal includes a suggested reorganization of the Agricultural Services of Nicaragua that has great merit.

This organization would provide for the creation of a semi-autonomous agricultural agency "Instituto de Tecnologia Agropecuaria de Nicaragua" (ITAN) to coordinate and administer the teaching, research and extension activities. ITAN would receive directly from the National Treasury the funds appropriated by the Congress, and presumably it would have considerable autonomy and flexibility of operation within the overall budget. It is believed that this organizational pattern would satisfy many of the country's requirements; therefore this proposal is strongly endorsed. The following comments about the three services are premised on the adoption of this organizational plan.

The Director of the Institute should have responsibility for welding the three separate services into a coordinated agricultural program by:

- 1) Coordinating the programs of the three branches to insure that personnel were being used most effectively and that each service was completely cognizant of the activities of the others. It would be expected, for example, that all technical personnel would be employed on a full time basis by the Institute but their time might be divided among two or more divisions. No outside part time professional employment should be permitted.
- 2) Insuring that programs were prosecuted on an integrated basis, with each department or group contributing whatever is required of them where programs cut across divisional lines.
- 3) Insuring that only those programs are undertaken for which sufficient resources exist to assure reasonable results.
- 4) Insuring the problems of major national importance receive primary emphasis from all quarters.
- 5) Insuring that strict discipline is maintained in the management of all facilities, especially vehicles, and that appointments, promotions and salary increases are based solely on merit.

The National School of Agriculture (ENAG)

- 1) The most urgent need of the National School of Agriculture is a well trained staff that is dedicated to the education of Nicaraguan youth. Therefore, it is important to begin immediately to recruit 10-15 present or potential faculty members for training to the Master's degree. This selection program should continue uninterrupted each year for at least 5 years.
- 2) Two options should be offered, as proposed, one in agriculture and one in animal husbandry, with the first three years being common to both. There is entirely too much background needed in each of these areas to permit students to achieve an acceptable degree of proficiency in both of them in $4\frac{1}{2}$ years of study. As soon as any specialization is contemplated, however, there will be an irresistible urge to fractionate the curricula into many areas. This is neither necessary nor can it be afforded by ENAG in the near future. Much can be accomplished in the direction of specialization by permitting a much larger number of elective courses. This would afford additional variation in training but not in the titles awarded.
- 3) The number of courses required per semester should be reduced to a level of 4 or 5 per semester. Concurrent with this reduction should come a complete reorganization of the pedagogy to a system in which the student has a formal text book in most courses and is required to read additional assignments in books and journals outside the text. This could actually reduce the cost of teaching, and it will increase effectiveness by requiring much more initiative on the part of the student,

and by exposing him to a much broader fund of knowledge. This will tend to place the teaching at a University level in fact as well as in name. (See sample curriculum attached)

- 4) The experiment station facilities should be used extensively for laboratory as well as for thesis work. The students could be used for almost all of the manual labor on the station to their own great advantage since most of them have no real farm experience. They would learn much more, have a chance to know scientific agriculture first hand, and be much more certain of themselves upon graduation. It cannot be recommended that the ENAG establish its own livestock herds and cultivated fields. These must be made available through EEA.
- 5) There should be some type of academic degree awarded for the successful completion of the course work required for a degree. Of the 61 students who have finished all course work, 51 have not completed a thesis and hence have no documentation of their completion of the formal technical training. The presentation of a thesis does not add materially to the acquiring of technical information, rather it documents a student's capacity to use that information. The professional degree of Ingeniero Agronomo could be better protected and respected by this process.
- 6) Introduce more courses in agricultural economics. This is a subject that is fundamental to the planning and execution of any development program in agriculture, particularly where the farm population to be served has so little access to adequate information for sound decisions. Some consideration should be given to choosing say up to 5 bright students at the end of their third year to be sent to the United States to complete a B.S. in Agricultural Economics. This might be necessary for a few years before adequate instruction can be obtained locally.
- 7) There is a desperate need for adult education in basic subject matter and ENAG should consider offering night courses in Managua or radio courses in basic subjects normally given in the first 2 years. Such instruction need not be formal in terms of credit or evaluation, but it should be systematically and carefully presented.
- 8) The ENAG should offer more short courses for farmers during the summer. Again, the adult agricultural population of Nicaragua has a great deal of "catching up" to do, especially those involved in production of export crops. ENAG should take the initiative immediately in requesting short term specialists through various technical assistance programs to offer short courses at advanced levels for the private technical advisors serving Nicaragua. This is basically a teaching obligation of the ENAG and one which no other institution here can discharge.

Illustrative Curricula for Agriculture and Animal Husbandry*

Primer Año

Cultivos	4	Zoologia	4
Quimica	4	Quimica II	4
Algebra	4	Geometria Analitica	4
Botanica	4	Zoot. General.	4
	<u>16</u>		<u>16</u>

Segundo Año

Bioquimica	4	Genetica	4
Calculo	4	Biologia	4
Econ. Agricola	4	Sociologia	4
Fisica I	4	Fisica II	4
	<u>16</u>		<u>16</u>

Tercer Año

Maq. Agricola	4	Fisiologia vegetal	4
Edafologia	4	Fitopatologia	4
Fisiologia Animal	4	Psicologia	4
Entomologia	4	Nutricion Animal	4
	<u>16</u>		<u>16</u>

Cuarto Año

Cursos de la especialidad	8	Curoso de la especialidad	8
Manejo de Fincas	4	Mercado	4
Agr. Eng. electiva	4	Electivo Libre	4
	<u>16</u>		<u>16</u>

Quinto Año

Cursos de la Especialidad	8
Electivos Libres	8
	<u>16</u>

* Assume a) most courses will be 3 hours lecture and a lab, b) that they will be thorough and not require further emphasis in "advanced courses", c) that progress is made by passing individual courses rather than a year's curriculum.

- 9) A pre-University year should be initiated and offered in Managua. This would serve as a more efficient "selection device" of competent students than the present first year program. There is at present an entering class of approximately 50, of which only 20 successfully complete the first year. The scarcity of dormitory and classroom facilities imposes a rigid ceiling on the number that can be admitted. Therefore, this enormous loss of students the first year has disastrous effects on the efficiency of the entire institutional operation. This drop-out is largely responsible for a graduating class of only 10 -13 students per year instead of the 35 to 40 that could normally be expected from an initial enrollment of 50. The entrance exam should be made more selective and those who don't pass should be given opportunity automatically to gain entrance to ENAG the following year by successfully completing the PRE-course.

The Agricultural Experiment Station (EEA)

- a. The Agricultural Experiment Station must be completely rehabilitated with technical staff before any serious reorganization is undertaken. No amount of investment in the Station will have an impact on Nicaraguan agriculture unless there is supplied the technical talent required in research. Therefore, the first move should be to recruit 10 - 15 present or potential staff members for training through the Master's degree in the United States. Such a program should continue uninterrupted for at least 5 years. Such a supply of scientists would add more permanent benefit to Agriculture than a comparable expenditure in any other approach.
- b. The EEA has been over-organized into divisions, departments and sections. This makes for excessive administrative work and seriously limits the capacity to attack problems in their entirety. To illustrate, a soil fertility problem is mapped by the Soils Department, chemically analyzed by the Chemistry Department and field tested by the Agronomy Department with no one having an overall integrating role. The EEA should be completely reorganized so that the major production problems, say in coffee, or pastures, or cotton, could be completely and exhaustively investigated by a single group.

If the close coordination between ENAG and EEA is achieved as recommended it would be quite practical to organize the EEA along major commodity lines, viz.

Projects in EEA

Coffee	Animal Industry
Cotton	Agricultural Economics
Cereals (corn, beans, rice)	Soils?
Horticulture (fruits and vegetables)	Entomology?
Pastures	Plant Pathology?
	Agricultural Engineering?

c. Implicit in the reorganization of the EEA is a complete review and reorientation of the research projects. Nicaragua has neither the time nor the resources to investigate problems of only theoretical or peripheral interest. The effort of EEA must be almost exclusively focused on the serious problems limiting production of the major crops. The research staff must mingle constantly with farmers over the country and know first hand what their problems are, rather than depend on political pressures to dictate the subject or research. For example, to have projects in ornamental plants but none in pasture and cattle management is a gross distortion of this country's needs. The reorientation of research projects above all must restrict its efforts to those projects which the resources of EEA can adequately support. An inconclusive research result is of no value to a farmer and inconclusive results on many problems breeds loss of confidence and support. Therefore, some genuine leadership must be exercised to prevent scattering the meager resources of manpower, operating funds, and physical facilities over too many projects, even if all of them are highly meritorious. It would be presumptuous to attempt a listing of priority projects for research, but several problems appear extremely important to agricultural development. They are listed here only as examples:

- (i) The total management and feeding of cattle during the 12 months could be greatly improved. Appropriate combinations of pasture improvements and management, forage conservation, feeding systems, time of breeding and marketing should be studied as a system.
- (ii) The use of fertilizers is increasing very fast and must continue to increase but there is very little technical information to guide its efficient use.
- (iii) Impounding of small ponds would be a tremendous boon to most rural areas in the central and western zones and their location, installation and management should be studied.

The Agricultural Extension Service (SEA)

The Agricultural Extension Service must clearly define its goals and concentrate its efforts in certain areas if it is ever again to be a significant force in Nicaraguan agriculture. This definition of goals and objectives must take into account several developments which either cannot or should not be reversed, namely:

- a) The existence and growth of a group of private farm advisory agencies which are serving the large commercial farmers. There is no reason why this development should not be encouraged through access to training programs abroad and by special short courses given locally by outside experts. This is a development that is only recently appearing in the United States though it has

been much more common in Europe. There is every reason to believe that it can provide the necessary service to the large and medium farmer of Nicaragua more efficiently and more economically than a governmental agency could. Therefore, the SEA should not give high priority to staffing for this area of service even though it has strong appeal from the standpoint of obtaining political support.

- b) At least two agencies, the Agrarian Institute and the Development Institute (INFONAC), are initiating activities which will require a concentrated effort in technical services of the type normally supplied by Extension but which should not be of high priority in SEA. The political commitments of the present administration to initiate agrarian reform activities are being given quick visibility by the acquisition of several properties and dividing them among landless "colonos". These projects are politically and emotionally sensitive and are being serviced by the Agrarian Reform agency. Inasmuch as SEA will not be able to accommodate all demands for service in the next few years, it would not be advisable for it to become heavily involved in them. INFONAC has several irrigation projects on the planning boards, the most advanced of which are the Rivas and Tuma projects. The land in these projects will have a high overhead development cost and therefore the farmers will have to have excellent technical support to be able to pay out. INFONAC is nominally responsible for providing such services but they have the serious problem of no source of supply of technical personnel. A small training center is planned at Rivas, but it seems to be moving too slowly to meet the needs. This group will need assistance immediately, but SEA should not divert its energies to such specialized areas at the expense of other areas being currently served. However, all outside technical assistance agencies should be responsive to any request for assistance in this area that comes from INFONAC.
- c) The Banco Nacional has an agricultural credit program that is supported by a loan from the Inter-American Development Bank and which makes some loans to small farmers. This program, as documented elsewhere, is not reaching far enough into the higher risk groups, i.e. those having less collateral. If the Banco Nacional finds it possible to provide credit to a wider portion of small farmers, SEA should be ready to provide technical advice.

Having delineated certain specialized areas that are of primary concern to other agencies, there remains a sharply defined responsibility of SEA. This is the large group of small and medium size farmers who have access to land either through ownership, homesteading rights or rental. Many are illiterate, have little capital, technical knowledge, or bargaining power, either in obtaining the requisite inputs of production or for marketing. This group is extremely important to the developing economy of the nation, however, because it is here that the greatest

potential exists for change from a traditional to a commercial agriculture. Efforts expended at this level will not pay off rapidly in terms of Gross National Product, but they will sow the seeds and nurture the potential for future economic development. Therefore, a strong effort at this level is not only highly commendable from a humanitarian standpoint, it is crucial to eventual achievement of a socially and economically sound society.

The present procedures and methodology of SEA are essentially sound. Only a few changes are recommended. It goes without saying that increased support in salaries, operating expenses, vehicles, etc. must be provided if any improvement is to be anticipated. These changes are:

- 1) Trained personnel are very scarce in SEA, and the few that remain are being pirated daily by other agencies. This agency needs an Ingeniero Agronomo in charge, and several Peritos Agronomos (Vocational Agriculture level) in each office. The amount of time which should be spent in direct service and contact with these farmers is very high because of their illiteracy and poor cultural background. The major portion of such direct service however, can be supplied quite adequately by technicians with a minimum level of training, if good supervision and technical backstopping is given them.
- 2) There should be 6 or 8 Extension Specialists, each with a Master's degree in his specialty. These Specialists must provide the close tie with the research program within the country and with technical developments in other parts of the world. They should have their offices with colleagues in their own specialty at ENAG or EEA. They should be very active in arranging demonstrations of new and recommended practices with the various field offices.
- 3) The actual content of the programs as now outlined by SEA is also quite good. However, the common complaint heard on all sides was the lack of resources of the farmers to carry out recommendations. Attempts to alleviate this problem through the formation of clubs and cooperatives have been successful at least to the extent that it has provided a more feasible basis for obtaining a loan and for acquiring land. It is recommended that SEA work closely with other agencies of the Government of Nicaragua to make production credit funds available to the farmers being advised or motivated by SEA. This would make it incumbent upon SEA to be sure their programs were directed toward total farm planning and operation, rather than toward the solution of isolated problems. Actual supervision of the loans is discussed in the section, Agricultural Credit.
- 4) The operation of El Recreo should be kept under SEA for the present because its immediate functions are to provide information and materials to the farmers of the region. Eventually, after ITAN is well staffed and functioning smoothly, it will probably be desirable to convert El Recreo again to an experi-

ment station. When this happens it would be logical for EEA to take over administrative responsibility.

Vocational Agriculture Schools

The great need for these technicians can only be satisfied by supplying most of them from Schools of Vocational Agriculture at the secondary school level. While this activity is extremely important to agricultural development, it should be developed jointly with the Ministry of Education. Specific recommendations in this area are:

- a) Add a curriculum of Vocational Agriculture to one secondary school in each agriculturally important Department. The curriculum of the secondary school would be altered in the 4th and 5th years to include 8 courses in agriculture as illustrated in the attached curriculum. This curriculum would qualify for the "Bachiller de Agricultura".

CUARTO AÑO

Horas por Semana

Trigonometria y Nociones de Topografia	3
Fisica I Curso (Propiedades Fisicas de los cuerpo mecanica, Acustica, y Termologia)	5
Quimica, Inorganica y Mineralogia	5
Filosofia I Cursee (Psicologia y Logica)	3*
Historia de la Literatura Espanola, Universal y Americana y Critica Literaria	4*
Historia de Nicaragua y Centro America	3
Frances I Curso (Conversacion y Composicion, Lecture, escritura y traduccion)	5*
Educacion Fisica	2

*Substitute for these courses the following:

Cultivos (Produccion, peste, cosecha, preparacion, almacenaje)	
2 Semesters	6
Zootecnica (Ganado grande y pequeno, manejo, alimentacion, procesamiento de producto)	
2 Semesters	6

QUINTO AÑO

Fisica II Curso (optica, electrologia y Meteorologia)	5
Quimica organica	5
Geologia y Cosmografia	3*
Revision de los estudios de matematicas, ejercicio y problemas	3
Filosofia III Curso	3*
Sociologia y Economia Politica	4*
Frances II Curso (Ampliacion)	5*
Educacion Fisica	2*

*Substitute for these courses the following:

1st. Semester - Suelos y fertilizantes	6
Enfermedades y parasitos del ganado	6
2nd. Semester - Ingenieria Agricola	6
Manejo de fincas y mercado	6

This would require two major laboratories at each school, one in crops and one in livestock. The teaching would be done by an extension agent jointly employed by the Minister of Education and the Extension Service. The practical work would be done in farmers' fields nearby and in cooperation with the other SEA activities in the community.

Each school of this type would have a capacity for producing 25-30 boys per year. This would be the most rapid and inexpensive way to add to the supply of technical people in agriculture and steps should be initiated immediately for its implementation.

The first step would perhaps involve sending 6-8 technicians to the United States or Puerto Rico for 1-2 years training in Vocational Agriculture where they would, at the same time, develop their curriculum materials. This should be repeated for at least 3 years at this level.

- b) The private International School of Agriculture should receive further assistance in revision of their curriculum and in improvement of their pedagogy. This assistance should be regarded as a useful interim measure, but the needs of Nicaraguan agriculture cannot be satisfied by this institution. This recommendation is made in full recognition that, because of its nature, this institution has many administrative problems. Such recognition should also temper later evaluation of results of any assistance given.

IMPLEMENTATION

The implementation of the program in teaching, research and extension must be carefully programmed and first steps taken first. It is apparent from the foregoing recommendations that the first step in each of the areas should be a strong program of training at the B.S. and M.S. levels. It cannot be emphasized too strongly that to effect major reorganizations without having adequately trained personnel ready to appoint in the key roles will only result in frustration, delays and perhaps failure. The same may be said about the acquisition of equipment and supplies or the importation of technical advisors. They will only be wasted on unproductive activity until trained nationals are available. The irresistible urge to have an immediate impact without laying the necessary foundation of trained nationals has perhaps been a major factor in the ineffectiveness of assistance programs over the past 20 years. Just imagine the permanent impact that would have been made by 20 M.S. degrees per year during that time.

There are three meritorious proposals for assistance under consideration at the present time, namely:

- i) A request to the U.N. Special Fund for personnel, equipment and training funds amounting to \$856,500 per year for four years.
- ii) A request to AID for the present team study; a Land Grant University Contract to backstop research, teaching and extension; and financial assistance loan in the amount of C\$2,680,000 (at C\$7.00/U.S. = U.S. \$382,857) for acquisition of additional dormitory, laboratory and classroom space and for equipment and livestock at ENAG. 1/
- iii) A proposal by the University of Pennsylvania to establish a veterinary center at LaCalera and to staff it for a 10-year period at a total cost of \$1,306,083.

A summary of these requests is shown on the following table:

	<u>ENAG</u>	<u>EEA</u>	<u>SEA</u>
Advisory Personnel (Man-years)			
UNSF (4 years)	13	7	7
U. of Pennsylvania (10 years)	80		
AID (indefinite)	?	?	?
Construction of Facilities (U.S. \$)			
UNSF			
U. of Pennsylvania			
AID	277,142		
Equipment (U.S.\$)			
UNSF	4,000	30,000	62,500
U. of Pennsylvania	13,611		
AID	105,714		
Training (Man-years)			
UNSF	16	10	10
U. of Pennsylvania	60		
AID			

1/ Although the original application did not specify, AID regards it as a loan request.

Each of the three proposals has merit, but together they do not represent a well balanced and compatible coverage of the needs in agriculture. It has been amply demonstrated in other countries that two or more outside agencies cannot be expected to work efficiently and harmoniously within the same local agency. Therefore, it is safe to assume that FAO, the University of Pennsylvania and an unnamed Land Grant University would find it almost impossible to service the new ITAN effectively at the same time. It would be a risk which the Nicaraguan Government should not take with the future of her agriculture. It would perhaps be useful at this point then to make an objective appraisal of the three proposals as a basis for further recommendations on choosing among them and on implementations.

The proposal for assistance from the U.N. Special Fund is well conceived and would serve the needs of ITAN very well. The only adverse comment on the personnel requested is the absence of specialists in the basic sciences at ENAG. Any improvement in the applied courses will immediately point up weaknesses in mathematics, physics, chemistry, biology and economics. These are courses that will limit achievement in the others and therefore should be among the first to receive attention. The proposed structure of ITAN is essentially patterned after the U.S. Land Grant University system. It is hoped that if the U.N. Special Fund project is accepted, FAO would be requested to recruit U. S. personnel with Land Grant University experience for these particular positions of the program rather than those who have little background in such an organizational philosophy. This request merits serious consideration by UNSF and is recommended by the team.

The request for a U.S. Land Grant University contract would duplicate in most respects the proposal for UNSF support. If it were highly probable that a good university contract could be negotiated, it would in many respects be preferable to the UNSF request. However, the major U.S. Land Grant Universities are already involved with all the foreign assistance programs they can staff with their own personnel. Any additional contracts undertaken by them would most likely be on a "hiring agency" basis, and that would be no more satisfactory to Nicaragua than the UNSF request. It is noted in the table above that only \$4,000 is included in the UNSF project for equipment for ENAG in anticipation of additional loan support from U.S. AID. Such additional support should be activated as soon as adequate personnel and space is provided. The only other question that arises is with respect to the purchase of animals and field equipment. Requesting them only for ENAG rather than for a herd accessible both to ENAG and EEA, betrays a lack of confidence in the full integration of the resources that should not be honored. It would be indefensible to support livestock herds at both the school and the station when operation funds are so limited.

The proposed University of Pennsylvania project speaks to a great need in Nicaragua. There is a severe shortage of veterinary services at present and this presents a real danger to the national economy with respect to export of beef. The proposal, however, suffers several deficiencies. a) It is not integrated with ITAN as it should be. Many of the disease problems of livestock in Nicaragua are intimately

related to poor nutrition and no program should permit veterinary services to be isolated from management and nutrition. b) The emphasis is on establishing an outstanding center and operating it for 10 years. The history of assistance programs suggests that such a center could not be operated on local funds alone and it would be unwise to build another monument to U.S. enthusiasm which cannot be operated by Nicaragua when U.S. support is withdrawn. Any program should be of a size and nature which Nicaraguan budget and management, beginning early, could gradually take completely over. c) This would inject another outside agency into the assistance program for ITAN, with no way of insuring coordination. Therefore, it is recommended that the veterinary services be provided for within the framework of UNSF advisory service and the AID loan for equipment. The level of development should be balanced with the other agricultural needs. The formal training of veterinarians should be accomplished at institutions already established outside Nicaragua.

Training

1. Each agency should be given a long term assignment of its ceiling for trainees. The ceiling number must be committed against trainees who have qualified by March 1 of the preceding year. Any becas uncommitted by that date should become available to any other agricultural agency on a first come basis.
2. Since training is a major bottleneck in national development, all impediments to the training program must be removed. Specifically it is recommended:
 - a) All expenses, including international travel, be paid by the sponsoring agency.
 - b) Remove restrictions on payment of salary while away and on a guarantee of employment upon return.
 - c) Provide free intensive language instruction in Managua on an around the clock basis for all potential becarios.
 - d) If the governmental agencies do not propose adequate number of candidates, advertise publicly the availability of scholarships on a competitive basis.
 - e) Participants should agree to return to GON employment for a period equal to their training.
3. Most of the training grants should be for one or two years, and whenever feasible should lead to a specific degree.
4. The autonomous agencies such as INFONAC, Banco Nacional, INCEI, etc., need to have complete access to this training program. This is especially true of the agencies having responsibility for the agricultural credit and cooperative programs referred to elsewhere in this report. The agricultural credit training program should involve a 4-6 month on-the-job training in FHA

in addition to course work at the undergraduate level in agricultural credit and related subjects. It is possible that this training may be in special courses organized for this purpose.

5. In the case of a few areas such as home economics agents, 5 to 8 per year should be enrolled in special AID sponsored training short courses in Puerto Rico or other Spanish speaking countries.

Technical Advisors

Technical advisors should no longer be considered by MAG as a free service which requires no additional outlay of resources on the part of G.O.N. It is a frustrating waste of both national and international resources to bring in outside experts before there are local technicians, operating budgets and organizational structure to take fullest advantage of their presence. This should be regarded as a guiding principle by both the host government and the assisting agencies. The initiation of any program except training should be regarded by G.O.N. as full commitment on their part to begin immediately to obtain the necessary budgetary support for the proposed activity.

The following implementation recommendations are premised on appropriate timing of G.O.N. increases in effective support, and to the extent that the implied G.O.N. support is unrealistic, these recommendations must be altered.

ENAG It is recommended that every effort be made to obtain approval of the request to U.N. Special Fund to become effective January 1965 and anticipation of arrival of 2 or 3 of the requested specialists on duty for the opening of school in June 1965. There should be some substitution in the requested list of specialists to include a chemist, biologist and a veterinarian in the first year in place of specialists in swine, forestry and food processing. The chemist and biologist should be sufficiently bilingual to teach these courses and restructure the laboratory work. The veterinarian should initiate the establishment of a veterinarian station similar to that proposed by University of Pennsylvania, but on a scale more commensurate with Nicaragua's ability to support it.

The order in which the subsequent specialists are brought in should be determined by the availability of adequately trained Nicaraguan counterparts on a full time basis. This obviously implies the payment of a salary to the trained Nicaraguan technician that would be adequate to hold him. It also implies increasing the operating budget for that department to a level that will justify the personnel. Note that this further implies that the increasing G.O.N. support be made in specific areas as they become ready to use it, and not by a gradual overall increase for ENAG. Admittedly the last point will be difficult to administer, but it is the only method for channeling limited increases in support into effective programs.

EEA The same general procedures should be followed for EEA as for ENAG. It is not likely that EEA will be ready to use more than one advisor before 1966. In the meantime there should be the identification of a capable Institute Director and a Director of EEA and a training of some of the major department heads. It is again emphasized that advisors to the proposed programs cannot be effective until there are trained persons to work with.

SEA Much can be accomplished in this program prior to the return of trainees. The proposed specialist in Agricultural Extension could be used effectively as soon as a) there is a change in the administration of personnel and funds as recommended above, b) an increase in salaries to facilitate recruiting, and c) availability of vehicles. One of the earliest activities performed by this advisor would probably be in-service-training and reevaluation of programs to conform to budgetary limitations as described above.

The specialist in rural youth work should be one who has considerable experience in vocational agriculture teaching and who should have responsibility for guiding the introduction of vocational agriculture instruction into the secondary schools as suggested above.

The specialist in home improvement could also be useful at an early date.

The subsequent specialists should be added as facilities and budgets of G.O.N. warrant.

Facilities

Construction of new facilities, such as those being considered under the proposed AID loan program, should be scheduled for approximately one year after the UNSF or Land Grant University team is in operation. They should advise on the real needs at ENAG and the rate at which needed facilities are to be added. This is also a type of activity which is often financed by the Inter-American Development Bank, and they should be invited to look at proposals early in their development.

There has been some talk of the necessity for moving the EEA and/or ENAG to a new location to allow for expansion of Las Mercedes air field and Air Force training facilities. It would be most regrettable if such a move were to result in a slow down or set back in the agricultural teaching and research activities, and it is hoped that such will not be the case. The move is recommended provided that funds may be found to build adequate replacement and that the new location be selected with extreme care to ensure that the professional staff will be happy. In any event, it would be unthinkable to undertake further construction at either ENAG or EEA until this issue is firmly decided.

In the event that construction is planned it should be scheduled for early 1966.

Equipment

There is such a complete lack of equipment and facilities in all agencies that it may seem heartless to suggest holding back on providing them. However, there is nothing to be gained by placing equipment, including vehicles, in the hands of untrained personnel. To do so would seriously prejudice later use. It also is not advisable to purchase equipment before there are G.O.N. funds for operation.

It is recommended that equipment purchases be made slowly as trained technicians demonstrate the need. It is recommended that only the basic equipment needed for specific programmed activity be purchased. Do not attempt to equip complete laboratories in hopes that some day a technician will find a use for it all.

Operation Supplies

Every laboratory and office is currently handicapped by the lack of simple glassware, reagents, medicine, syringes, fertilizers, etc. It is recommended that assistance in such matters be provided only when and where the G.O.N. finds it possible to provide for its annual support after an initial replenishment. The starting of programs only to have them stopped at the end of one or two years must be avoided by rigid, disciplined planning.

Therefore, the rate at which expendable supplies are provided will be determined by the rate they are included in the following year by G.O.N.

Implementation Schedule

The implementation schedule for ITAN and vocational agriculture should involve the following levels of commitment on the part of G.O.N. These levels are established on the basis of anticipated availability of trained technicians. The derivation of the data is detailed here and the data are summarized in the table of Implementation which follows.

ITAN Director's Office should be established by early 1965

Director	(\$800/M)	\$ 9,600
Assistant Director	(\$600/M)	7,200
Employees (3)	(\$150/M)	5,400
		<u>\$22,200</u>
Equipment (10% of salaries)		2,200
Materials (10% of salaries)		2,200
Operations (10% of salaries)		2,200
		<u>\$28,800</u>

ENAG

The school should be fully staffed with trained personnel by the beginning of the school year in June 1966. At that time it would have need for the following minimum configuration:

	<u>No. equivalent full-time professors needed</u>
Administration	3
Basic sciences	3
Agronomy	3
Animal husbandry	2
Social sciences	<u>1</u>
	12

- a) Professional salary level of \$500/month average would appear to be adequate and competitive for good personnel \$ 72,000
- b) It would be highly desirable to provide a salary scale that would recognize merit rather than using a fixed salary as at present.
- c) An increase in average salaries of 10% per year and an increase in number of courses taught of 10% per year would provide for reasonable expansion and improvement.
- d) Non-professional personnel ranging from lab assistants, secretaries, to cooks and yard men should average \$150/month, with a total of 20 being needed 36,000
- e) Materials and supplies (20% of salaries and wages) .. 20,000
- f) Equipment (20% of salaries and wages) 20,000
- g) Operating expenses (10% of salaries and wages) 10,000
- Total salaries, wages, equipment, etc. \$158,000

EEA

The Agricultural Experiment Station could anticipate having half of its full complement of professional staff by the end of 1966 and the remainder by the end of 1967. The following configuration would represent a minimum professional staff:

Administration	2	Animal Industry	4
Cereals	3	Soils	2
Coffee	3	Agricultural Economic	2
Cotton	3	Entomology	2
Horticulture	2	Plant Pathology	<u>2</u>
Pastures	2		
		Total	27

a) Assume on average salary of \$500/month with variation according to qualification	\$162,000
b) Sub-structure would be by projects and <u>not</u> require the formal establishment of Departments with the implied administration structure.	
c) Non-professional assistants (Secondary school level) 27 each one \$200/month <u>average</u>	64,800
d) Day labor	20,000
	<u>\$246,800</u>
e) Equipment (20% of salaries and wages)	50,000
f) Materials and supplies (20% of salaries and wages) ..	50,000
g) Operation expenses (20% of salaries and wages)	50,000
	<u>\$396,800</u>

SEA

The Extension Service could begin rehabilitation earlier than the above Divisions but it will be slower in reaching its full minimum staffing patterns which would be about as follows by 1968:

Central Administration	4	\$ 20,000
Extension Specialists	8	40,000
15 Agencies - With 4 technicians each including a vocational agriculture teacher at 6 locations			207,000
15 Sub-agencies - with 2 technicians each			90,000
Non-professional employees 65			<u>117,000</u>
Total			\$474,000

a) Assume:	
Administrative unit salaries will <u>average</u> \$500/month	
Agents will average \$400/month	
Assistant Agents will average \$250/month	
b) Approximately 65 non-professional employees (secretaries, etc.) will be needed at an average \$150/month	
c) Equipment (15% of salaries)	71,000
d) Materials (15% of salaries)	95,000
e) Operations (15% of salaries)	48,000
	<u>\$688,000</u>

Vocational Agriculture

- a) Assume vocational agriculture sections added to each of 6 major secondary schools. They could be staffed by 1966 with at least one outstanding teacher. The salaries are included under the staffing pattern for SEA since they would be SEA employees.
- b) They would require additional budgets for supplies and equipment to maintain their laboratories as follows:

Supplies	\$2,000/school	\$12,000
Equipment	\$2,000/school	\$12,000

SCHEDULE OF NEEDED GOVERNMENT OF NICARAGUA BUDGETARY SUPPORT

		(In U. S. dollars)				
		<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>
ITAN	Total		28,800	31,200	33,800	36,400
	Salaries		22,200	24,000	26,000	28,000
	Equipment		2,200	2,400	2,600	2,800
	Materials		2,200	2,400	2,600	2,800
	Operations		2,200	2,400	2,600	2,800
ENAG	Total	81,000	92,000	156,000	182,000	212,000
	Salaries	75,000	80,000	106,000	127,000	152,000
	Equipment	2,000	5,000	20,000	22,000	24,000
	Materials	2,000	5,000	20,000	22,000	24,000
	Operations	2,000	2,000	10,000	11,000	12,000
EEA	Total	230,000	230,000	260,000	396,000	436,000
	Salaries	200,000	200,000	200,000	246,800	271,000
	Equipment	10,000	10,000	20,000	50,000	55,000
	Materials	10,000	10,000	20,000	50,000	55,000
	Operations	10,000	10,000	20,000	50,000	55,000
SEA	Total	125,000	280,000	440,000	688,000	765,000
	Salaries	100,000	200,000	300,000	474,000	520,000
	Equipment	10,000	30,000	50,000	71,000	80,000
	Materials	10,000	30,000	60,000	95,000	110,000
	Operations	5,000	20,000	30,000	48,000	55,000
VO-AG	Total		24,000	26,000	30,000	36,000
	Equipment		12,000	13,000	15,000	18,000
	Material		12,000	13,000	15,000	18,000

TRAINING IMPLEMENTATION SCHEDULE

(Cost in dollars, number of participants in parenthesis ())

	1965	1966	1967	1968	1969
ENAG					
UNSF	(4) 20,000	(8) 40,000	(6) 30,000	-	-
USAID	(6) 30,000	(8) 40,000	(8) 40,000	(8) 40,000	(8) 40,000
EEA					
UNSF	(2) 10,000	(4) 20,000	(3) 15,000	-	-
USAID	(8) 40,000	(8) 40,000	(8) 40,000	(8) 40,000	(8) 40,000
SEA					
UNSF	(2) 10,000	(4) 20,000	(3) 15,000	-	-
USAID	(4) 20,000	(6) 30,000	(6) 30,000	(6) 30,000	(6) 30,000
Vocational Agriculture					
USAID	(4) 20,000	(4) 20,000	(4) 20,000	(4) 20,000	(4) 20,000
Autono- mous Insti- tutions	(8) 40,000	(8) 40,000	(8) 40,000	(8) 40,000	(8) 40,000
TOTAL	(38)190,000	(50)250,000	(46)230,000	(34)170,000	(24)170,000

Implementation Schedule (5 Years)
for
ITAN and Vocational Agriculture

	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>
	(1,000 dollars)				
Training					
Foreign Assistance	190	250	230	170	170
Government of Nicaragua	---	---	---	---	---
Personnel					
Foreign Assistance	50	90	180	180	80
Government of Nicaragua	381	514	680	929	1,031
Equipment					
Foreign Assistance	50	90	46	15	---
Government of Nicaragua	22	59	105	161	180
Materials					
Foreign Assistance	---	---	---	---	---
Government of Nicaragua	24	59	115	184	210
Operations					
Foreign Assistance	---	---	---	---	---
Government of Nicaragua	17	34	62	112	125
Construction					
Foreign Assistance	---	277*	---	---	---
Government of Nicaragua	---	2,000*	---	---	---
Total Nicaragua	444	666	962	1,386	1,546
Including relocating	---	2,666	---	---	---
Total Foreign	290	707	456	365	250
Grand Total	734	3,373	1,418	1,751	1,796

* Assumes ENAG and EEA are relocated.

AGRICULTURAL COMMODITY PRODUCTION PICTUREGeneral:

Some significant changes have been occurring in the agricultural production picture in recent years. Some commodities have attracted much investment capital and management skills and have rapidly made the shift from traditional production methods to modern mechanized operations and utilization of fertilizers, insecticides, herbicides and other modern devices to increase productivity. Included in this category is much of the cotton, sugar cane produced, and recent new banana and tobacco plantings, along with some livestock and products producing units. On the other hand some of the important traditional food crops are still being produced with primitive methods and are having a great deal of difficulty maintaining their volume and productivity or have lost considerable ground. In this latter category are corn, beans, rice, sesame and coffee.

Agricultural, livestock and forestry products still constitute the preponderantly major factor in exports and production of international trade for the country. However, the establishment of integrated development policies and goals and consistent implementation in the production picture toward definite goals are still largely lacking. Some dynamic and spectacular developments are taking place both in the local national scene and in the economic integration efforts for Central America but without a completely developed and integrated national policy clearly stated.

In this section of the report, the agricultural production picture of the country will be described in relation to the gross domestic production estimates, fomenting "divisas" (exchange earnings), land use, and comparative commodity production patterns. Later some observations on future guide lines for commodity development will be presented.

AGRICULTURAL PRODUCTION CONTRIBUTION TO THE GROSS DOMESTIC PRODUCT AND FOREIGN TRADE

While no official Gross National Product Calculations are made an official calculation of Gross Domestic Product is made which according to the Country Program (AID) of September 16, 1963, can be approximately adjusted to GNP by deducting investment income from the Gross Domestic Product. In 1962 the estimate of investment income was 4 million dollars or 28 million cordobas. The locally calculated Gross Domestic Product will be utilized in the following comparisons.

In 1962 the GDP was calculated to be 2,811.7 million cordobas (401.7 million dollars) which was a 11.3% increase over the 2,526.4 million cordoba figure for 1961. Population increased 3.3 percent so it is concluded that per capita GDP increased 8%. GDP per capita reached the approximate figure of US\$ 246 which is at the highest level of record but which was also reached in 1955.

According to the loan request proposal for Resource Evaluation prepared by the Ministry of Economics in October, 1963 the contributing sectors to the GDP can be roughly separated as follows for 1961 and 1962:
(Amounts in million cordobas)

Sectors Contributing to Gross Domestic Production:	1961		1962	
	Amount	%	Amount	%
Agriculture (Including crops, livestock, forest and fish products)	935.7	37	1,055.5	38
Manufacturing (Predominantly related to processing agricultural products)	1,068.3	42	1,287.4	46
Mining (Gold, silver and copper)	84.4	3	88.6	3
Other Sectors	438.0	18	380.2	13
	<hr/>	<hr/>	<hr/>	<hr/>
Total Gross Domestic Product	2,526.4	100%	2,811.7	100%

For the agricultural sector the percentage breakdown by general categories of the total value of production in 1961 was the following according to Ministry of Economy figures:

	<u>% of Total Agricultural Sector Value at Production</u>
Crop Production	59.4
Cattle and Milk	29.4
Forest Products	5.2
Poultry and Eggs	2.7
Pork	2.6
Hunting and Fishing	0.6
Bee Products	0.1

Total exports in 1962 were approximately 637 million cordobas (\$91,000,000) of which agricultural products constituted over 80%. Major agricultural exports are the following with 1962 values in million cordobas.

Cotton and Cotton seed	271.3
Coffee (Beans and Soluble)	133.7
Meat	42.0
Sugar	31.5
Wood Products	21.0
Banana	0.8

It is understood that both cotton and meat exports increased considerably in 1963 over 1962.

GENERAL LAND USE ESTIMATES

Data from the 1963 census are not yet available and data now available on land use are very general and are based on estimates only. FAO Production Yearbook for 1960 provides the following estimates of land distribution:

General Land Use Categories	Million Hectares	% of Total
Total Area of Country	14.8	100.0
Land Cultivated in Crops	0.8	5.4
Land in Pastures	0.7	4.7
Forest Lands	6.3	42.3
Other Areas (Areas in lakes and land in non-agricultural use and waste land)	7.0	47.8
Land Included in Farm Units (Number of Farm Units - 52,000)		
Total land in farms	2.4	16.2

Of the land in farms approximately 33% is cropland, 25% is pasture land and 42% is forest and other land. There appears to be room for some additional land development and more intensive use of existing crop and pasture land in some areas. The wet tropical forest areas

extending throughout the eastern half of the country are generally unknown but based on its known ecological conditions there are serious limitations for extensive development of this area for more intensive use. Until more scientific knowledge is achieved on possible uses of these wet forest areas in intensive pasture or crop use the yield from an adequately managed forest exploitation and conservation will probably constitute, generally speaking, the highest economic return from the preponderant portion of this area in the long run. Experience to date indicates that efforts in clearing and intensive crop or pasture production are generally short lived in such wet tropical forest areas.

COMPARATIVE PRODUCTION FIGURES OF IMPORTANT AGRICULTURAL PRODUCTS

As indicated previously the total value of annual agricultural production of Nicaragua has exceeded one billion cordobas in recent years. In Table I are presented data on areas planted to various most important crops together with production achieved and some livestock production figures for selected years. In Table II are presented some unit yield figures for the most important crops for the same years.

Some important shifts in the crop production pattern are evident in the data presented in Table I during the last 13 years. For example, among the annual crops, cotton has increases in areas planted and in production many fold. Productivity increases in this crop are especially noteworthy. Some of the traditional food crops such as corn, beans and rice have made only moderate gains in areas planted and in some cases, as shown in the tables, productivity has declined.

Data available on livestock numbers are only estimates as is the case of timber exploitation. INFONAC has made the following estimates of cattle numbers in the country for 1964:

Cows	656,000
Bulls	55,000
Oxen	118,000
Steers	170,000
Other Cattle	<u>822,000</u>
Total Number	1,821,000

According to the National Statistics Office figures approximately 9% (between 150 to 160 thousand head) of cattle numbers on ranches are slaughtered each year which is still a relatively low turn-off percentage even taking into account that a significant portion of the cattle on hand are in dairy herds. The same source indicates that annual hog slaughter amounts to 75 to 80 thousand head in recent years.

Table 1.--Principal crop and livestock production in Nicaragua for selected years.

Annual Crops	1949-50		1954-55		1959-60		1961-62		1962-63 ^{1/}	
	Area (1000 Has.)	Production (1000 M.T.)	Area (1000 Has.)	Production (1000 M.T.)	Area (1000 Has.)	Production (1000 M.T.)	Area (1000 Has.)	Production (1000 M.T.)	Area (1000 Has.)	Production (1000 M.T.)
Corn	115.2	115.2	122.0	101.9	132.4	98.9	149.1	123.2	140.5	123.8
Cotton (Fiber)	15.3	3.3	88.9	46.2	68.1	29.5	79.4	56.4	94.2	73.2
Grain Sorghum	34.5	54.0	49.3	48.5	49.7	39.2	56.0	50.0	55.8	48.5
Beans	27.1	18.5	44.0	31.4	40.5	22.0	47.1	32.0	42.7	29.3
Rice (Milled)	15.9	12.9	18.6	16.4	21.4	20.3	24.4	24.2	22.6	22.8
Sesame (Hulled)	14.9	7.7	17.4	8.7	16.5	8.4	11.0	6.2	6.5	2.5
Mandioc (Yuca)	1.7	6.2	1.8	8.7	2.0	10.2	2.1	10.9	N A	N A
Tobacco	0.4	N A	0.5	N A	0.8	N A	0.9	N A	N A	N A
Potatoes	0.1	1.3	0.3	3.3	0.9	11.3	0.9	12.1	N A	N A
Permanent crops:										
Planted Pas- ture	654.2 ^{1/}	N A	N A	N A	1420.8 ^{1/}	N A	N A	N A	N A	N A
Coffee	72.6 ^{2/}	22.3	80.1	23.0	97.3	23.8	106.9	24.8	111.1	27.3
Sugar cane	14.2	514.0	17.7	741.6	20.2	954.6	28.3	1307.3	22.9	1195.0

Table 1. con't.

	(area) 0.8	(prod.) 0.3	(area) 1.2	(prod.) 0.5	(area) 1.7	(prod.) 0.7	(area) 1.5	(prod.) 0.6	(area) N A	(prod.) N A
Cocoa										
Bananas	48.33/	N A	N A	N A	N A	N A	N A	N A	N A	N A
Livestock ^{1/3} products:										
Beef		N A		16.0		22.0		24.0		
Pork		N A		4.0		3.0		4.0		
Milk		N A		115.0		200.0		300.0		

General Source: National Planning Office Statistical Tables.

- 1/ Pasture estimates for 1951-52 and 1958 respectively
- 2/ 1950 Survey
- 3/ 1952 Survey
- 4/ Source of livestock data is U.S.D.A., ERS publication Foreign #44
- 5/ Preliminary MAG Figures

Table II
YIELDS PER HECTARE (Kilograms)

<u>Products</u>	Y e a r s				
	1949-50	1954-55	1959-60	1961-62	1962-63
Corn	1,000	714	544	680	
Cotton (Fiber)	654	1,561	1,297	2,130	
Grain Sorghum	1,565	984	790	892	
Beans	680	714	544	680	
Rice (Milled)	1,298	1,413	1,517	1,584	
Sesame Seed (Hulled)	611	588	595	663	
Mandioc (Yuca)	3,582	4,834	5,054	5,054	
Potatoes	12,842	12,782	12,800	12,793	
Coffee	220	260	220	200	
Sugar Cane	36,209	41,977	47,174	46,205	
Cocoa	399	400	400	400	

Export data on timber products are available but local timber use is only estimated. Recent year indications are that the equivalent of between 50 to 60 million board feet of lumber are produced annually, about half of which is exported. 1961 exports of timber is reported as follows:

<u>Type</u>	<u>Bd. Feet (1,000)</u>	<u>Value (1,000 dollars)</u>
Caoba (Mahogany)	9,659	1,037
Cedro Real	4,383	619
Guayacan, Nambar or Cocobolo	498	78
Pino, Ocote (Pine)	13,040	1,166
Other Woods	<u>229</u>	<u>13</u>
Total Exports	27,809	2,913

With the exception of pine lumber most of the timber exports are in the form of logs and sawing and processing is performed outside the country.

OBSERVATIONS ON FUTURE PRODUCTION PATTERNS FOR THE AGRICULTURAL SECTOR

Specific product production goals have not been established by the appropriate government officials inasmuch as the medium term and long range development plan for the country has not yet been completed. General indications made by several officials in the government contacted by the study team are that very substantial increases in total Agricultural production are hoped for during the next few years. Some general estimates of 15% overall increases per year were expressed.

Based on ecological conditions, national implementation efforts, foreign assistance possibilities and international market prospects the following observations are made on some of the more important agricultural enterprise possibilities for the future.

I. Export Products:

The technical production practices which have been developed to a reasonable degree, the basic ecological conditions in the tropical and sub-tropical dry areas where cotton is grown which are favorable, the extensive processing plants developed and the current market conditions for cotton which have primarily been developed by private interests without much government intervention indicate that this industry in Nicaragua is well established and should continue to constitute a very important enterprise in the national economy. Some

cautions or red flags probably are necessary with respect to needed conservation practices including crop rotation and judicious use of fertilizers, insecticides, and herbicides together with economical balancing of production areas with available seasonal labor supplies to assure long range continuity in the activity. However, private interests have been able to make cotton production a very dynamic activity in Nicaragua and for the immediate future little government technical and financial assistance either national or international appears to be needed.

Coffee is the second most important export commodity of Nicaragua. This industry is having difficulty in keeping up to date although recent world price increases may be helpful in providing resources for more investment for this purpose. Because of the chronic world surplus in coffee production the policies of internationally oriented agencies greatly limit the amount of technical and financial assistance which can be provided for coffee production improvements. However, this is an important crop in the economy of Nicaragua and is ecologically adapted to soils and topography which has very limited uses for alternative ^{intensive} crops. Consequently, it is justifiable that the Government of Nicaragua through its Ministry of Agriculture and autonomous development and financial organizations should develop a more adequate program of research and education together with credit assistance to improve the productivity of this crop. This could be done by programs for research and education on improved practices and economic and physical resources evaluation to fix the better areas for coffee production and eliminate the marginal producing areas and farms.

Sugar cane production methods are relatively well advanced in the country and little government intervention in this activity is required. Marketing through international agreements is the main problem in which the government is of necessity involved. It is not yet clear what influence the integration of Central American markets will have on sugar cane. However, practically all these countries are more than self sufficient in this product so markets must be sought elsewhere.

Meat and animal fats constitute a relatively wide open market possibility in international trade at the present time because most tropical countries are deficient both in supplying current demands for animal products and consume far below recommended dietary standards for such products. Increased competition can be expected from some other countries but Nicaragua is favorably endowed with significant areas ecologically adapted for livestock production. Efficiency and unit productivity in both the beef and dairy cattle fields are still very low, even though significant stimulus has been provided in the past and is now being provided for improvement through special credit, herd improvement and management programs and a rapidly developing foreign market made possible by a modern integrated meat packing plant. An accelerated and continuous research and education program together with continued credit services for adjustment type loans should have high priority in government plans and finances. This will especially be true in the development of the milkshed area for the Matagalpa Dried Milk Plant project as well as in the beef cattle and other livestock fields.

While some significant regional projects are under way on research and management of some forest areas it appears that considerably more work is necessary to gain adequate knowledge and management skills for this important national resource which probably has been subject to destructive exploitation without concern for sustained yield. Some of the wet forest areas which may be subject to clearing as population pressures increase possibly would yield more economic return in the long run if they were left in forests and managed and exploited in a rational manner. A great deal of urgent inventory and research work is still needed in this respect and should be included as part of the government's long range development plan. Also, there appears to be considerable room for vertical diversification in the lumber industry through more elaboration of the wood products, especially the hardwoods, before they are exported.

Vegetable oils and fats still are in short supply. However, it is noted that the sesame seed production in Nicaragua has been drastically reduced in recent years, probably because of the inability to compete with cotton for the most productive land. This is not a point of great concern but perhaps in some of the planned irrigation projects sesame production can find a logical place. The fact that this highly acceptable oil seed crop has been losing out in Nicaragua should serve as a red flag in possible plans for development of other oilseed crops on a more extensive basis in this country. At least it should indicate the necessity of exhaustive study of all the ecological, technical, and economic factors involved before embarking on other oil seed development programs.

The recent renewing of interest in banana production in the tropical dry areas on the Pacific side of the country and possible renewing of interest in developing areas for Cavendish banana production on the Atlantic side no doubt are based on ecologically sound considerations. Some government support in financing are indicated but marketing arrangements and technical services can most likely be left to the private interests involved. Marketing contracts are possible with the old established banana companies which apparently are inclined to get out of the production end of the business at this time and concentrate on marketing. This should provide some opportunity for small and medium sized farms to produce a highly remunerative product if all technical production requirements can be met. Similar comments with respect to Tobacco production as an export crop and possibly rubber as made above for bananas are indicated.

II. Food and Other Products Principally for National Use:

Nicaragua has traditionally exported some grains and beans to other Central and South American countries. However, in recent years the production of corn, rice and beans has suffered in competition with cotton for the most productive lands and production has not kept pace with demand. Recently imports have been necessary for grains and beans. Apparently, also, management practices and production methods have not kept pace and unit productivity has tended to reduce in several commodities most of which are still produced under primitive conditions.

The irrigation projects being studied are partly intended to make possible more modern production methods in these essential food crops. It is evident, from an ecological standpoint, that the country should be able to produce all its internal needs for corn, rice, beans, sorghum, mandioc, potatoes, tropical fruits, and other similar products and it is suggested that such be a production goal. This will, of course, require a substantial program of research in improved practices, development of adequate well trained technicians for the necessary extension and other educational work and for credit agents. A very substantial increase in financial support and technical abilities in these tasks should be given high priority in short and long range government programs.

APPENDIX V

CURRENT STATUS OF

BASIC RESOURCES INFORMATION AND STUDIES

REQUIRED FOR ORDERLY RURAL DEVELOPMENT

General:

Nicaragua, together with most other Latin American countries, has shown increased interest in recent years in rural development as evidenced by several specific government sponsored development projects and the enacting of an Agrarian Reform Law in 1963. This has pointed up the serious need for organized basic information on the physical and human resources of its rural areas and the realization that it lacks adequate scientifically collected and evaluated information on its basic resources. Organized information on land, water, vegetative cover, climate, manpower, and economic institutions for important regions of the country is not now available and constitutes a significant obstacle to intelligent planning and execution of rural development projects and programs.

Urgent development programs sometimes must be delayed while basic resource descriptive information is developed or, more seriously, sometimes specific development activities are undertaken without adequate information and analysis of basic resources being done which frequently result in costly mistakes both in capital and in human effort and hardship.

Modern techniques in reconnaissance surveys of basic resources utilizing skilled technicians and aerial photographs have greatly speeded up the process of developing maps and other descriptive information on the fundamental resources which formerly required very laborious and step by step increases in the store of knowledge and time requirements spread over generations to accomplish. However, organized effort and expenditure of significant amounts of funds are still necessary to assure adequate and continuous development of needed descriptive and evaluative information to stay ahead of development planning and action requirements in a developing country with rapidly increasing population, such as Nicaragua.

In this section of the report a brief outline of basic resource subject matter requirements for orderly development of the use of such resources will be presented, along with an analysis of the present status of such needed information including some institutions involved in Nicaragua. Also, some important projects to meet the need in this field of work are already under consideration in the country, and will be the subject of observations and suggestions.

OUTLINE OF SUBJECT MATTER FOR BASIC RESOURCE SURVEYS

Preliminary Considerations:

Several physical and social scientific disciplines should be involved in descriptive basic resources analysis as indicated by the subject matter suggested in the following outline. Also, the level of intensity of the work will vary from reconnaissance levels, to semi-detailed, to detailed, depending on the stage of development of a region and on the amount of basic information immediately available. Ordinarily it is necessary first to make exploratory and reconnaissance level surveys of basic resources with descriptive maps prepared of some resource factors at scales of 1:100,000 or smaller. These surveys would point up priority development areas which would justify more detailed work as required. However, in areas which have been utilized for productive purposes for many years and considerable knowledge has already been accumulated, detailed analysis of basic resources can be immediately justified as a foundation for more intensive use of the resources available. All such survey work should be oriented to the practical application of the basic resource information to economic and social development of the country. Essential subject matter facts are indicated in the following outline.

- I. Natural Conditions of the Country Including Description of:
 - A. Geology and Physiography of the Land Area
 - B. Meteorology and Hydrology (Surface and subterrenean)
 - C. Pedology (Soils Groups)
 - E. Ecology and Vegetation
- II. Natural Renewable Resources describing:
 - A. Forest characteristics and conditions
 - B. Land Types and Potentials
- III. Present Productive Uses of Resources Including Description of:
 - A. Use of Resources and Nature of Productive Use
 - 1. Intensity of exploitation and yields
 - 2. Conservation or lack of conservation aspects
- IV. Human Resources and Institutions
 - A. Population Characteristics
 - B. Structure and operation of Principal Types of Producing Units (Farms, Ranches and forest exploitation units)
 - C. Conditions and institutions which affect productive use of resources including:

1. Land values and tenancy, capital and labor supplies, together with tax structures
2. Production supplies and services
3. Credit sources
4. Technical assistance and training services
5. Market services and facilities, transportation and communication
6. Social services including educational, health and other community services required.

V. Evaluation of Potential Use of Natural and Human Resources Available

It is clear that various government agencies are involved in the assembly and study of the fundamental points of basic resources information and analysis. These include the "Direccion General de Cartografia", the "Direccion General de Estadisticas y Censos", Ministries of Agriculture (Soils Department) and of Economics (Geology Service); the National Meteorological Service, Office of Planning, National Economic Council and others. However, in view of the following observations on the status of this material and the range of proposed remedial projects, one specific agency of the government, such as the Office of Planning, should be assigned the central responsibility to push the completion of necessary basic resource studies and analysis as soon as possible, utilizing existing government services as much as possible.

PRESENT STATUS OF BASIC RESOURCE INFORMATION

I. Natural Conditions:

A. Geology: A National Geological Service was established in 1955 as a part of the Ministry of Economics and a limited staff has been working on studies of mineral possibilities of the country, preparation of a geological map of the country on a very small scale, studies on possible utilization of volcanic thermal energy for producing electricity and general advisory service to the government and private industry on geological matters. At the present time it has an annual budget of \$133,287. It has the use of a fairly well equipped laboratory, but has only incomplete geological information on the country. Some additional information is available in the Forestry Department, Ministry of Agriculture.

B. Meteorology: A National Meteorological Service was established in 1957 under the Ministry of War, Navy and Aviation and has been operating with 4 stations located at Managua, Juigalpa, Puerto Cabezas and Bluefields. It was principally engaged in providing

information for aviation until recently when more ample technical facilities and reports have been started. Its present annual budget is \$72,133. It is clear that this type of work needs strengthening. Some old rainfall data collected by the United States Canal Commission and some private property owners are available. It has some weather information obtained from the World Meteorological Organization.

C. Hydrology: Organized records of surface and underground water conditions are very scarce. The National Energy Commission has some river flow data at specific project cites and the Municipal Services Department and the Development Corporation (INFONAC) have some well log information in specific project areas.

D. Topographic Mapping: A Geodesic Office was established in 1946 through a joint agreement between the Governments of Nicaragua and the United States of America. It operated as a part of the Military Academy, establishing bench marks and traingulation points until 1955 when it was transferred to the Ministry of Development and began the year after to elaborate basic topographic maps. In 1960 the name of the Agency was changed to that of General Cartographic Office (D.G.C.). It now works with an annual budget of \$201,076 with 80 employees in making a series of topographic maps at the scale of 1:50,000 which are also reduced to 1:100,000. It is collaborating with the Interamerican Geodetic Survey (IAGS) which has an approximate equal/budget in Nicaragua. The Army Map Service (RIC)/Wash. is preparing a series of topographic maps at 1:250,000. As of October, 1963 the National Cartographic Office had topographic map sheets at 1:50,000 for 38,000 Km.² leaving 92,000 Km.² of the country still to be completed. The present rate of map production covers 8,000 Km.² per year. The area covered with these topographic maps is in the western third of the country where most of the population is concentrated. About 3/4 of the rest of the country is covered with maps at 1:100,000. The availability of vertical aerial photographs suitable for topographic and resource mapping work covers approximately 80% of the country but obtaining extra copies of photos for other work is difficult because of limited resources of the D.G.C. USAID has provided some equipment grants to this agency in the past.

E. Ecological and Vegetation Maps: A general Ecological Map at the scale of 1:1,000,000 was prepared by Dr. L.R. Holdridge on contract with USAID in 1962.

A relatively detailed study of the ecology of 3 separate areas was published jointly by the Ministry of Economics, INFONAC and FAO in 1959, Ecological Land Use Surveys in Nicaragua, by Dr. B. W. Taylor. These studies, which deal with conditions in the Puerto Cabezas-Rio Coco, the Matagalpa-Esteli-Ocotol and the Boaco-Santo Tomas areas, include considerable information on climate, soils, land types and geology as well as vegetation

(forests, crops and pastures). They also include interesting program recommendations. This and several other studies may be obtained in the Forestry Department of the Ministry of Agriculture.

F. Soil and Land Use Maps: The soils department at the Ministry of Agriculture in collaboration with FAO technicians have been working on semi-detailed soil surveys around Lake Nicaragua, at the scale of 1:50,000. One sheet for the Chiltepe area covering approximately 24,000 hectares with its accompanying report has been published and the soils department technicians in the Experiment Station informed the team that field mapping for 4 more sheets has been finished but lack of funds has prevented publication. It is clear that only a very small percentage of the land area of Nicaragua is covered by soil maps of any type. It is understood that land use capability maps of each of the Central American countries are being made by FAO/Mexico on a scale of 1:750,000 and that such a map will soon be available for Nicaragua. USAID has provided some grant funds for equipment and publishing in the past.

G. Forestry Resource Studies: Organized scientific information on the very important forestry resources of the country, especially on the Atlantic slope, is very deficient. Data are available on exploitation in a central source for only the woods exported and no data are assembled on local consumption. Forest resource work is obviously needing urgent attention. A long-term forest inventory and management project is being carried out at the present time on a 15,000 Km.² area in the extreme Northeastern part of the country through the collaboration of the Special Fund of the U.N. Apparently, for the remainder of the country, research and forest management is inactive.

H. Economic and Social Analysis in Rural Areas: The shortage of technicians for economic and social study and the need for analysis, both at Macro and Micro levels, especially of the latter, is very critical with reference to basic resource evaluation. The new Agrarian Reform Law will be severely handicapped unless steps are taken to correct the lack of economic and social information required. A national census was completed last year and when results are available some basic information will be available. Previously only sample surveys of rural conditions have been made and it is reported that only farm owners and their properties have been reported in previous surveys. Accurate data by number of farms, farmers, land tenure, land use and the principal crops and livestock will be of considerable interest and use when it becomes available in the near future. Basic farm management, marketing, and other studies are extremely scarce and urgently needed.

I. Rural Development Institutional Services: Discussion of these services such as elementary and technical education, crop and livestock research, farm and home extension, distribution and marketing

services, health and other community service will be presented in other sections of this report.

SOME PROPOSALS NOW UNDER CONSIDERATION WHICH DEAL WITH NEED FOR BASIC RESOURCE EVALUATION

A. General Information on Physical Resources Project (GIPR):

This refers to a map and information compilation service proposed as a Central American Regional project to utilize the services of the Inter-American Geodetic Survey and the U. S. Army Map Service in compiling a 1:1,500,000 scale available information on a wide range of subjects for Central America and each country therein. It will be undertaken under a ROCAP - SIECA agreement and to be financed by USAID. This no doubt will be a valuable compilation of existing information in the basic resources field and the preparation of the map material at a uniform scale will provide a convenient and comparable general reference source. As indicated by the scale, however, it will present only general information and more detailed research will still be necessary in order to provide adequate resource descriptive material for planning purposes.

B. Aerial Photographic Work:

A Central American Regional Project Contract is providing some additional aerial photographic materials and coverage.

C. Integral Program of Evaluation and Utilization of Natural Resources and Improvement of the Real Property Tax System

This program, submitted to the Central American Bank for Economic Integration (CABEI) by the G.O.N. in January of 1964 encompasses an AID-financed loan for a many faceted program of considerable potential use in the development of programs for rural and agricultural development in Nicaragua. The integral program is conceived as a ten-year schedule of activities for which the loan proposal would provide for the initial or three-year period. While the obvious purpose of the three-year program is the installation of a modern and equitable property tax system, it includes provisions for a comprehensive evaluation of natural resources and provides for a program of mapping and resource inventory in support of the tax system, together with an electric data processing system which should prove invaluable in planning and carrying out agricultural development programs. The loan application was approved by the National Economic Council and was authorized by the Ministry of Finance and Public Credit.

In order to achieve the goal of establishing the real property tax system and inaugurate the program of tax collection within the three year period, an area of 35,000 Km.², or roughly one fourth of Nicaragua has been delimited as the high priority area.

The total loan is for approximately \$4.7 million of which about \$3.2 million would be in local currency. The G. O. N. would also contribute about \$2.9 million. The breakdown of the total loan by programs would be as follows for the three-year period:

Program	Amount of proposed loan (dollars)
I Real Property Tax System	1,089,131
II Natural Resources	
(a) Geology	584,867
(b) Renewable resources (soils & vegetation)	345,143
(c) Ground Water <u>1</u> /	
(1) Urban use (430,980)	
(2) Irrigation (285,429)	
T O T A L	716,409
(d) Meteorology	106,466
T O T A L (Resources)	1,752,885
III Mapping	1,300,161
IV Electronic data lab.	<u>127,330</u>
	4,269,507
Plus 10% contingency	<u>426,950</u>
Loan Total	4,696,457

1/ Excludes a surface water program to be financed by U.N. Special Fund, G.O.N. and CABEI from non-AID sources.

While these loan programs, together with the relatively detailed resource analysis and mapping implied, appear to fall far short of a desirable goal of complete national coverage, they probably will encompass the area in which the bulk of agrarian development and reform programs could reasonably be initiated or carried out under present urgency conditions, within the next three years.

These programs would provide well integrated financing greatly to strengthen several agencies involved in basic resource evaluation and would go a long way to meet the need for basic resource data and maps for all program purposes, if each agency fully cooperates through the Planning Office, National Economic Council in the exchange of all appropriate data.

Following is a summary of the various programs together with the responsible agencies:

I. Real Property Tax System; Director General of Revenue, Ministry of Finance.

Separate provision for taxing real (immovable) property and property rights was included in new tax legislation passed in 1962. The program would supplement the legislation and require an evaluation of lands and improvements based on use, location, size, topography, accessibility, water conditions and land capacity. The law requires that all owners of real property register each property giving location, bounds, total area, buildings, declared value, and other information. A second tax law affecting personal property requires the registration of vehicles, farm animals and other items.

The property tax system proposed under the loan agreement, which provides for the appraisal of urban as well as rural lands, would appraise the latter by classification according to productivity, schedules of unit values, modifications for location, topography, accessibility and water availability, as well as the classification and appraisal of buildings.

Maps: The development of a property tax map system is a major aspect of the proposed program since it provides an essential aid in the discovery, listing and valuation of the complete inventory of property. The proposal would provide maps on a uniform scale of 1:1,000 for urban property and 1:10,000 for rural parcels which would contain only information of a pertinent nature. A contract has been made with a private company (under an AID grant) covering an area which, combined with that completed by the U.S. Air Force, embraces about 22,000 Km.² and provides air photos at 1:20,000 covering more than half of the contemplated appraisal area. Plans call for including a substantial part of the remainder during the current (Nov. 1963 through April 1964) dry period. This could be completed in the dry period beginning in November 1964. Since the photos at 1:20,000 can be enlarged to the desired 1:10,000 without enough distortion to materially affect their accuracy for assessment purposes, it appears that an excellent basis for detailed resource evaluation and agriculture planning will be established.

According to the National Resources Inventory Procedures and Descriptive Specifications, AID/RIC Manual No. 1, p. 15, the map sheets . . . "by virtue of their coordinate grid, are suitable for purposes of automatic data processing". While feasibility studies would first be necessary, there is a distinct possibility that electronics data processing eventually could be used.

Since the plan also contemplates the full exchange of information between agencies, it is perhaps significant to note that the classification system used by the Soil Conservation Service as given in Soil Survey Manual, Tech. Bulletin 18, U.S.D.A. will be those used in the sub-project dealing with renewable resources. The factors to be considered in establishing land values, would include rentals; commodity prices, labor costs, management costs; population density; soil fertility, topography, erosion, draining; accessibility to markets, ports, schools, urban centers; condition of roads and the availability of water.

It seems fair to conclude that the proposed system, which would incorporate most of the concepts of national resource appraisal, directly or indirectly, would provide an adequate basis for agricultural development and reform in the designated area. It is recognized that some of the information obtained from the Tax Program may be useful only to the extent it applies to adjacent or similar areas.

Let us now briefly consider the impact of the overall loan proposal as it relates to the activities of other institutions:

II Natural Resources

- a. Geology, National Geological Service, Ministry of Economy: The CABEI-AID loan of \$584,867 would provide under the 3 year program, (1) a geological map of the country at 1:500,000, based on all data available to date from appropriate foreign as well as domestic sources; (2) a map of the Pacific area at 1:50,000 showing the area and limits of different types of rock, geological structure, industrial materials, mineral and metals; (3) an inventory of materials Pacific zones, for those which can be used in agricultural and related industries and for construction, including fertilizers (potassium and phosphates), insecticides, mineral used in filters and sugar refining; (4) for strengthening the service with expert technicians and (5) for constructing a building to house valuable equipment.

Funds also are to be supplied by the G.O.N. and the supporting document lists a grant of \$743,500 from the U.N. Special Fund.

- b. Soils and vegetation, Soils and Forestry Departments, Ministry of Agriculture.

The present administration is keenly interested in developing a more dynamic program of resource inventory evaluation. Laboratory facilities are so elementary and technicians so few that little can be done without considerable outside assistance. The fields to be included in the three year program will be soils, geomorphology, vegetation associations, forestry, land use and land capability classes. The soils program will employ advanced technicians to work with selected national counterparts. On vegetation studies a group of local technicians would be trained by an advanced national technician and FAO expert

in Nicaragua, as well as by foreign technicians. The three year program contemplates a study of the important Pacific coast region at a scale of 1:50,000, of the central region on the same scale and a reconnaissance type inventory and evaluation of the Atlantic coastal region. In addition to the soils classification work, applying the USDA's Soil Service Manual mentioned earlier, new soil samples will be collected and analyzed. The general reconnaissance work will include examination, classification and delineation of dominant soils and principal types of vegetation on these soils. Notes will be kept on the different crops, types of management and production data under various management systems.

c. Ground Water:

(1) Urban use, National Department of Municipal Services, Ministry of the Interior and Annexes. This is a program to execute a complete hydrological study of ground water sources in the Pacific coastal zone for utilization of these sources for a potable water supply. The first phase will include studies to design water supplies for 22 cities, most of which are located in this area. The balance of the ten year program will be devoted to the Pacific slope area.

(2) Irrigation, National Development Institute (INFONAC). To find adequate ground water supplies in the Pacific zone for irrigation in fifteen selected areas where irrigation might be recommended, comprising a total of 130,000 hectares, INFONAC will, in addition to continuing with its present development program, organize and supervise the drilling of proposed 260 slim holes for electric logging and 65 test wells to be located, one for each 2,000 hectares. Where adequate water is found, individual land owners will contract with the private drilling company for its use. After this company signs a contract with a land owner, it is to be presented to INFONAC for financing, presumably from the loan funds. It is not known to what extent the work of FAO ground water geologist, Marcel Solignac, will be used in this program.

d. Meteorology, National Meteorological Service, Ministry of War, Navy and Aviation

This proposal contemplates the addition of seven stations to the 4 now existing, four in the Pacific zone and three in the Central and Eastern zones; including additions to technical personnel, supplies, instruments and vehicles in order to make adequate weather forecasts for civil and military aviation, agriculture and the general public. The additional equipment will include some with specifications for first order synoptic stations and will include observations of barometric pressure, temperature, (maximum and minimum daily), precipitation, relative humidity, wind (direction and intensity), hours of sunlight, radiation, soil temperatures and evaporation. Information will

be communicated daily to the main office. The purposes of the project include making available all scientific weather knowledge to obtain a high level of agricultural productivity and the answering of questions relating to hydrologic resources and the development of plans for large basins. It is not clear how this would be done with the facilities to be provided.

While Nicaragua proposes a contribution, the loan is for a three year program and the proposal does not refer to any expansion beyond that time. There is also a question whether the additional seven stations would be justified. If the proposal of the National Energy Commission to establish up to 65 meteorological stations (including 250 rain meters, etc.) is approved for financing by the U.N. Special Fund, CABEI and the G.O.N., this might imply some duplication of services.

III Mapping Work, General Cartographic Office, Ministry of Development

The loan request provides for augmenting the staff and facilities to make possible the following improvements in the Central Cartographic Office:

- A. Double the speed at which the topographic maps at the scale of 1:50,000 can be completed. At the present rate of work 12 years would be required to complete these basic maps. It is proposed to provide facilities to complete them in 6 years.
- B. Make it possible for the cartographic office to provide more detailed topographic maps for specific development projects as required which is not now possible.
- C. Make it possible for the Cartographic Office to provide more complete and efficient service in making aerial photographs available to other government entities as needed.

IV Create an Electronic Data Processing Center in the Planning Office:

It is proposed to obtain a modern electronic data processing system (IBM 1620) to provide efficient scientific service in processing natural resources survey data and other government agency data as required. This is badly needed to improve service and scientific investigation efficiency of many development programs.

It is clear that most of the proposals under consideration as indicated above constitute significant and serious efforts to meet the needs of the country in basic resource analysis and provide some essential services in the field of work now critically lacking. Implementation of these projects should be given high priority by the government of Nicaragua and International Agencies involved. It is true that all the points covered in the original outline in this section are not covered by

presently available data and research programs now activated or proposed. However, the proposals provide an integrated approach to supplying the major portion of such basic resource information needed. Some additional needs are indicated following part D of this section.

D. Surface water measuring stations, meteorological and rain stations, National Energy Commission, Ministry of Development and Public Works

This Commission was founded in 1955 to study, plan and develop a national electric power system from any source including water power. In 1962 it prepared a five year development plan in collaboration with the U.N. Special Fund. In order to complete this program about 250 rain stations, 65 meteorological stations and 69 limigrafic (river flow) stations were to be installed at various places throughout the country. The plan provided for the installation of ten meteorological and river flow stations and fifty rain meter stations each year for five consecutive years. The river flow stations to be installed along the Pacific coast are considered of prime importance for irrigation, potable water and industrial uses; those in the Central zone for hydroelectric projects, irrigation and flood control and in the Atlantic zone for long term planning in navigation, irrigation and power.

The weather and rain stations would cover most of the country and supplement those of the National Meteorological Service. They would be equipped to supply information on precipitation, evaporation, humidity, surface and soil temperatures, wind velocity and atmospheric pressure. The information would serve for studies of irrigation, sanitary water supply and hydroelectric projects while the 250 rain stations would supplement the meteorological stations. If approved, the services of these stations might appear to be more useful in long term planning than those of the Meteorological Service. This service would also provide a river and rainfall gauging system for INFONAC and the Department of Municipal Services.

EVALUATION OF BASIC RESOURCE INVESTIGATION AND FUTURE NEEDS

As indicated in the foregoing section some of the pending proposals, if activated, would go a long way toward meeting the critical needs for basic resource investigation and analysis. Some gaps are observed, however, in plans and proposals for research in the field of work as indicated in the following:

1. No adequate plans or provisions are evident for essential economic and social research and interpretation which should be given high priority for the orderly development of rural areas. Some of the subject matter not covered are the following:
 - a. Farm management and other micro-economic studies and interpretation dealing with individual producing units and their operators who must make the decisions for changes in production methods and selection of producing enterprises.

- b. Research Institutional factors affecting the uses of natural resources; such as community services of schools and medical care together with marketing services and facilities which are strong deterrents or stimuli, depending on their effectiveness, to reasonable uses of natural resources and rural development.
2. Provisions for supplying technicians needed for the many proposed improvement programs in resource use and management together with the handling of the overshadowing educational task for rural residents in resource utilization and conservation.
3. Provisions for Macro Economic planning and establishing national policy and goals for resource use in the future.

Suggestions on methods and programs to cover these needs are made in other sections of this report.

APPENDIX VI

PRELIMINARY APPRAISAL OF AGRARIAN REFORM IN NICARAGUA

In his report on the Agrarian Reform Law made for the President to the Congress on March 11, 1964, the Minister of Agriculture emphasized the importance of the Agrarian Reform Law as a measure: to improve the national economy; to raise the standard of living of the farm population including the salaries and welfare of farm workers; to improve and regulate land tenancy; to create a cadastral system which would guarantee ownership and permit a just tax system; to provide sound agricultural credit; to provide a system of guarantees which stimulates capital investment in farms; and to create a system conducive to initiating a process of self help.

The team sees in Nicaragua a country which is rich both in natural and human resources, with a large number of small and medium farmers who have, by dint of disciplined effort, entered the economic life of the country. It sees them contributing directly though modestly through commerce to the nation's effective output and through taxation to its social and economic development. It stands ready to recommend a hand of assistance to those in this category and to those who are making sincere efforts to enter this class. It recommends that agricultural development be directed at all three classes through the Agrarian Reform program, to help them obtain: (a) the security of tenure, (b) the credit, (c) the farm management know-how and (d) the marketing assistance which are the essential factors in this process.

The Law, if applied carefully and equitably, seems to provide a reasonably sound basis for achieving these goals.

While both the intent and the terms of the Law seem to be the creation of a "fountain of national prosperity" and a sound agricultural sector based on social justice, it is possible that political and personal pressures and ambitions may disturb those who wish to make the program economically sound and effective.

The Institute will inherit about nine agrarian colonies already established or being established with a thousand families on a total area of 26,200 acres, of which about 2,300 acres are understood to be actively cultivated. It is not known how much is suitable for pasture and livestock.

A cursory inspection of two of these colonies seems to suggest that they incorporate a number of defects which the new Law is intended ultimately to correct. In both cases there was some doubt as to the suitability of the land and in one case the title was in dispute. The parcels seemed inadequate in size and arrangement. Many of the colonists, who appeared to have been settled mainly by chance, appeared in poor health. They seemed to expect increasing government assistance and were generally unhappy. Not only did the government services appear too expensive in scale to continue into other areas, but their nature appeared to be generating too much

dependence on the part of the colonists. Agrarian colonies of this nature should be undertaken only where there are overriding political or social considerations which the G.O.N. judges are unavoidable.

Recognizing that a major goal of agrarian reform is that of bringing as many as possible of the submarginal farm families into the economic life of a country by giving them a full opportunity to compete, it is clear that the program should start with the best of latent resources, both natural and human, to be successful. Competition in the commercial area will be difficult, at best.

The ultimate impact of the Agrarian Reform Law will depend on how it is interpreted and administered. While a complete evaluation is not yet feasible, a preliminary appraisal of some of the law's provisions seems worth while. Among the more important features are:

1. Provision for the complete use of the natural (soils, etc.) and human resource information which would be assembled under the new cadastral (land tax) and related surveys and under the 1963 agricultural census.
2. Provision is made for exerting reasonable care in the selection of colonist families according to location and sound standards.
3. The principle of giving priority in use to G.O.N. land, which the proposed surveys may show to be generally ample for the program. The proposed cadastral survey, together with the required registration of property, may reveal that the area under G.O.N. control is somewhat greater than generally believed, especially if exaggerated claims exist. 1/ This would help avoid the dangers of yielding to political and personal pressure in bargaining, thus to avoid any public criticism. It would avoid the payment of needed program money or an increase in internal debt when bonds were used in payment. It could avoid long and costly disputes over titles and over the value of land to be purchased. It could avoid the necessity of making mere shifts in land use from one crop to another, thus to encourage new area development and expanded national production.
4. The principle of fair payment to owners for land purchased or expropriated for the program. The procedure, both of expropriation and for setting the land value, appears rational. The National Constitution requires that payment be made in cash in advance for any land which is expropriated. Land purchased amicably may be paid for in bonds or in cash over a period of time.

1/ It also seems likely that the tax on unused lands, which would become effective July 1, 1965, may result in considerable reversion of land to the Government.

5. Provision for free titles on up to 50 hectares, with protection on up to 100 hectares to the bonafide campesino who demonstrated a minimum of one year's farming performance on peacefully occupied national land and protection to small and medium farmers who wish to be covered under the Law. Titles are given to colonists who have met reasonable payment obligations and followed certain practices. Titles may be revoked under mutual agreement, or for acts in violation of the Law, such as abandonment of family and parcel.
6. It provides for a fair payment schedule on all parcels in the new colonies, allowing each colonist a discount of 5 percent for each child born after the colony is established. The payment period is in effect 17 to 22 years with interest at 5 percent.
7. Establishment of a reasonably complete basis for setting up and protecting family-size farm units.
8. It takes precautions against cutting up the family farm unit by preventing its division among heirs, provides for the selection of successors and prevents its sale or transfer to those who would put the land to uses alien to the program.
9. It applies the principle of the social function, protecting the owner of productive farms, except in rare cases.
10. It will place a tax on unused or idle farms under a schedule of rates which depend mainly on the productivity of the soil. This tax is to be effective July 1, 1965.
11. It will penalize those who fail to practice conservation when appropriate regulations are passed.
12. It specifically avoids colonizing lands not suitable to or needed by the program.
13. It empowers the Institute to regulate tenant contracts and prohibits the old practice of demanding work in payment for rent.
14. It provides small colonies or separate plots for farm workers for their subsistence gardens.
15. It provides a school program in coordination with the Ministry of Education.
16. It encourages and assists large owners to establish private colonies under appropriate regulations, which include the provision of schools.

17. It contains broad provisions for the establishment of cooperatives for the common development of land, for purchasing, for sales and exports, transporting or processing, for credit, for joint work on improvements, and for other activities in the common interest. Regulations are provided to prevent the formation of "false" cooperatives and their exploitation for selfish or political reasons.

There are, however, certain apparent underlying weaknesses. The most important is the Law's apparent oversight in not adequately providing for developing leadership among the small farm class. The local agrarian councils could relieve the Institute of much responsibility in local decisions. With the local councils presided over by a representative of the Institute and with representatives of the Banco Nacional and the Extension Service, as well as those elected by the colonists, there may result little acceptance of basic responsibilities by the campesino members in these councils..

Possibly there are too many paternalistic restrictions. Some effort to encourage a broad regional or national organization of campesinos should be made to help them solve their own problems.

It is also not clear on the extent to which the credit needs of the campesinos and their organizations will be met. This problem is discussed in the section of this report on Agricultural Credit.